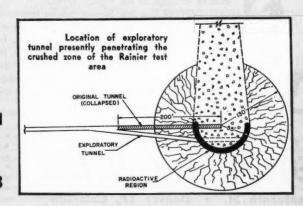
# MINING CONGRESS JOURNAL

**NOVEMBER 1958** 



Highlights of the AMC Mining Show - - Page 46



Underground NUCLEAR Explosions ——Page 78



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## MINING CONGRESS JOURNAL

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**NOVEMBER 1958** 

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### CONTENTS

ARTICLES

Opinions expressed by authors within these pages are their own and do not necessarily represent those of the American Mining Congress.

High Production in Thin Seam Mining J. L. McQuade	38
Ammonium Nitrate Blasting—Underground Joseph B. Elizondo	42
Continuous Mining in Thin Seams W. J. B. Mayo	, 70
The Practicability of Present Day Plant Automation Carlton M. Marquardt	72
Selection of A. C. Distribution Equipment John A. Stachura	75
Nuclear Explosions The Rainier Test. Possible Mining Applications Gerald W. Johnson (p. 78) David D. Rabb (p. 79)	
Benefits of Reducing Circulating Solids J. J. Reilly	81
Coal Haulage Ernest Bruns	84
Industrial Mineral Resources of the Western States Richard M. Foose SPECIAL REPORT	87
San Francisco Mining Show DEPARTMENTS	46-69

Editorials	3/
Wheels of Government	91
Personals	94
News and Views	. 96

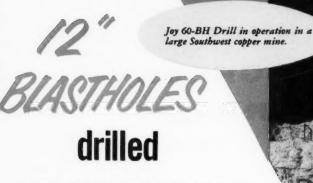
### Manufacturers Forum ON OUR COVER

New equipment and new techniques were spotlighted at the AMC Mining Show in San Francisco. Turn to page 46 for a synopsis of the events

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105



CONTINUOUSLY

in any rock ... Here's the ONLY drill that can do it!



Here's the champion at drilling larger, lower-cost blast-holes where the going is tough and high production is a must. The Joy 60-BH Super Heavyweight Champion has the power, the stamina... the sheer muscle... to bottom blastholes fast, shift after shift, month after month, in hard or soft formations. And it can drill out of the hole, too, when necessary. Here's why the per-formance of this big drill cannot be matched—it excels in all three of the features which determine bit penetration:

**STRONGER ROTATION**—Up to 14,850 ft. lbs. of torque can be applied *continuously* and safely. Accurate control of infinitely variable bit speeds and constant indication by gauge.

HIGHER BIT PRESSURE—Joy hydraulic-feed method of applying bit pressure—gripping the rod at the most logical place, near the collar of the hole—permits con-

tinuous pressures up to 75,000 lbs.; assures more accurate control than other methods.

MORE EFFICIENT CUTTINGS REMOVAL-Only Joy uses a heavy-duty, industrial-type, water-cooled air compressor

to insure an optimum, continuous air supply.

Other features . . . rod handling device to reduce heavy rod handling and the longest derrick available to reduce or eliminate rod additions.

Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

Write for FREE Bulletin 251-3





Core Drills



Slushers



QUIPMENT FOR MINING . . . FOR ALL INDUSTRY

Rock Bits



e

p

**Drillmobiles** 



# Cutting costs at largest U.S. asbestos mine...

one rubber-tired tractor handles clean-up around 4 scattered shovels...shuttles back and forth to level overburden dump

At their 3,000-acre quarry on Mt. Belvidere, near Lowell, Vermont, The Ruberoid Co. of New York is extracting asbestos-bearing rock around the clock, winter and summer. Men and machines are literally moving huge sections of the mountain from pit to processing plant. The latest, most modern equipment and methods are employed. One rubber-tired 210 hp



Rubber-tired tractor drives to scattered jobs fast. Tournatractor handles clean-up assignments at the Vermont mine 24 hours a day ... year-around, through winter and summer.

Tournatractor® adds to the efficiency of this operation by handling all clean-up around shovels and dump. This LeTourneau-Westinghouse tractor is on call constantly, 24 hours a day, every day of the year.

#### Dozes at speeds to 3.3 mph

Tournatractor's primary task is cleaning-up around the mine's 4 large electrically-controlled shovels. Keeping this area of the quarry floor smooth and free of loose rock, helps lower tire maintenance costs on haulers, and permits faster shovel operation. With its dozer blade, Tournatractor pushes big rock to bench toe at speeds to 3.3 mph; return is made in high reverse, 7.2 mph.

#### Travels mile in minutes

In order to handle maintenance on overburden dump, Tournatractor must travel one mile from the "upper mine". It takes only a few minutes for this fast-stepping, rubber-tired tractor to drive to the dump. It goes man in 1892 on Mt. Belvidere, one of the northernmost peaks of the Green Mountain chain. Today — employing more than 200 men — operations are being carried on from the 1,500-ft. level down to the 1,050-ft. level, across a width of about 3,000 ft. Asbestos-bearing ore is blasted loose from the quarry face and hauled to crushers. After a number of steps of crushing, ore is milled to remove valuable fiber. Asbestos fiber from the Vermont mine has a variety of uses in fireproofing materials, plastics, paper, millboard and, most important, many long-lasting, maintenance-free building materials.

right to work... completes the job and quickly returns to quarry floor. Tournatractor makes this 2-mile round-trip a number of times each day. Another assignment is to clean-up after blasts. Also, unit occasionally helps pioneer roads into new areas of operation. Wherever Tournatractor goes, its big, low-pressure tires cross electric-cables, air-drill hoses and blacktop.

### High-speed operation with low maintenance

On shovel clean-up, owner-verified reports show Tournatractor outproduces conventional tractors 2-to-1. Users find that Tournatractor works and travels faster, gets more work done in less time. Owners find, also, that tires cost less to maintain... eliminate the need for expensive track repairs or time-consuming track assembly lubrications. Why not let us show you how Tournatractor can help you increase production and lower operating costs? Call or write for a demonstration.

CT-1659-MJ-1



A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

# LET'S BE SPECIFIC...

about facts why H & P Fine Coal Cleaning Circuits are operating so successfully.

We design and build coal preparation plants with tried and tested H & P approved equipment, specifically...H & P Fluid Bed Dryer, H & P Sieve Bend, H & P Cyclones and Reineveld Fine Coal Dryer

H & P FLUID BED DRYER

Coal

Eparation
& P apH & P

...in other words, the best equipment of it's kind!

But above all, the H & P designed Coal Preparation Plant is the product of a team of enthusiastic, yet precisely analytical engineers who blend experience with ingenuity. They, in turn, are backed by modern production facilities and methods. To sum it up, you will find teamwork and know-how when you deal with Heyl & Patterson.

For complete information, request the visit of an H & P Contracting Engineer or write for these brochures:

557—Coal Preparation Plants

1157-H & P Cyclones

558-H & P Sieve Bend

247-H & P Bradford Breaker

557-R—Reineveld Fine Coal Dryer



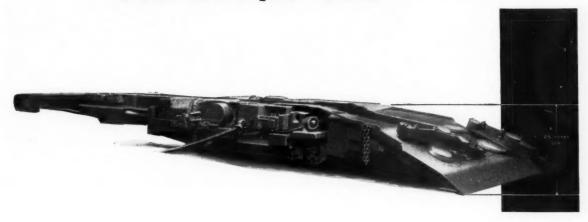
H& P SIEVE BEND

REINEVELD FINE COAL DRYER

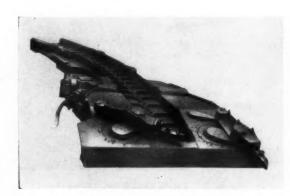
Heyl & Patterson INC.

BT-FIFF BLYD., BITTERUROR S.F. PAIR SPAIR 1-088

# for high capacities in low seams... 400 tons per shift



### **JEFFREY 81-C Loaders**



Gathering head on Type 81 Jeffrey crawler loaders is fully gear driven; no chain drives between head motors and gathering arms.

Just 25 inches high, this newest Jeffrey crawler loader is ideally suited for low seam work. Offers the same timetested features that made Jeffrey's 81-A and 81-B loaders so popular...fast, easily maneuvered, highly productive.

The Jeffrey 81-C loader is powered by four 15 HP electric motors and a 4 HP hydraulic motor . . . power for the toughest jobs. It has a rated capacity from 6 to 10 tons per minute . . . averaging 400 tons per shift in 33" seams, keeping loading costs to a minimum. Moves fast from place to place, hits loading stride quickly and stays on the job until the work is done.

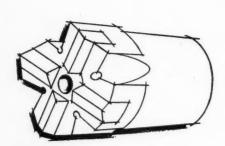
Like all Jeffrey mining machinery, Jeffrey loaders are available for either AC or DC power. With Jeffrey equipment you can make your mine all-AC.

Flexibility built into the Jeffrey loader lets it work most efficiently with other face equipment and the same mining cycle. Conveyor swings 45° either side of center and elevates properly to load shuttle cars on the straight or in break-throughs. Can be turned in its own length.

THE JEFFREY MANUFACTURING COMPANY
958 North Fourth Street, Columbus 16, Ohio

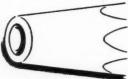


CONVEYING PROCESSING MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

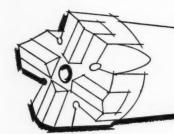


# NOW!

# **REMOVABILITY**



# AND



# **ONE-PIECE STRENGTH**

# IN AN AIR-LEG BIT!

AIR-LEG drillers, now you can have your cake and eat it, too. The new Timken® tapered socket bit is removable—yet gives you the strength of one-piece steels. The secret is the taper. It gives you all the advantages of removability with a strong, secure union.

Here are a few of the plusses you get with the Timken tapered socket but can't get with intraset steels because they're not removable.

 You don't have to throw away the drill steel just because the carbides wear out. You do with an intraset steel.

2. You carry just a pocketfull of bits into the mine. Try putting an intraset steel in your pocket.

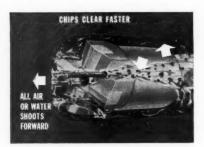
3. You can quickly change bit gage sizes using the same steel. With an intraset steel, you have to change a whole steel.

4. You don't have to lug the whole steel back to the shop to resharpen the cutting edges. You do with a 4-point intraset steel.

5. You get four carbide cutting edges. You get only two with a chisel intraset steel.

And you get further economies because the Timken tapered bit clears chips faster. The picture at right shows you how. New special-analysis carbide inserts give superior wear-resistance with added shock-resistance. And they can be reconditioned many times.

For removability and strength, use the air-leg bit of the future. Write for our free brochure. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



CHIPS CLEAR FASTER because 1) new five front holes shoot water or air directly against the rock face and 2) new deeper, wider wing clearance lets chips wash back faster.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

AVAILABLE NOW!

THE AIR-LEG BIT OF THE FUTURE



The "MH" is specifically designed and built for greater production at the lowest cost-per-ton in the toughest mining applications.

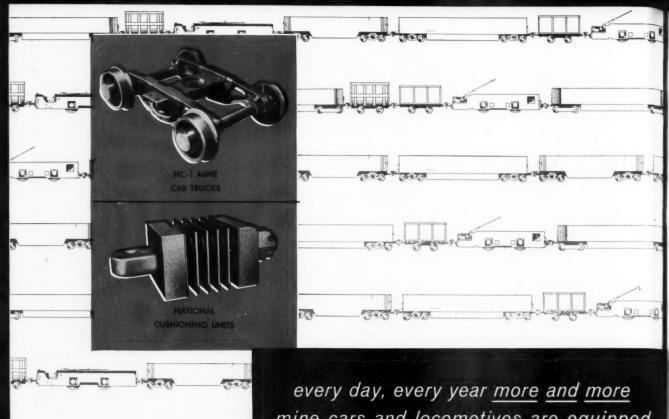
- Higher Arch
   Wider Front
- Tapered Basket Greater Strength

41/2 to 14 Cubic Yards with or without Perforations

HENDRIX MANUFACTURING CO., Inc.

MANSFIELD, LOUISIANA





mine cars and locomotives are equipped with

NATIONAL DEVICES

No matter whether you're considering the purchase of new mine cars or locomotives . . . or whether you're thinking of upgrading existing equipment now is the time to investigate the advantages of National devices.

For every day cost-conscious operators everywhere are switching over to National devices because they know they get more out of their equipment investment per workshift . . . per day . . . per year.

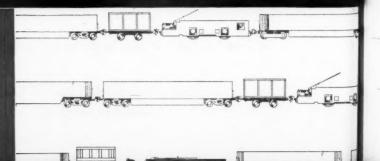
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National Malleable and Steel Castings Company







# Roebling Presents THE NEWEST CONCEPT IN WIRE ROPE Herringbone\*

two ropes in one!

Here is a combination that has proved itself during three years of field testing. A welcome addition to Roebling's great line of wire ropes, Royal Blue Herringbone is both a regular lay and lang lay wire rope!

So, in one rope you have the greater flexibility and abrasion resistance of lang lay construction *plus* regular lay's superior stability under severe operating conditions.

Preformed Herringbone is made of two pairs of lang lay strands, and two strands of regular lay which separate the two pairs of lang lay—all of it made of Type 1105 rope wire.

For three years Herringbone has been used for general hoisting, holding and

closing lines, shovel ropes, wagon scraper ropes and dragline ropes. Without reservation, its performance has been superior to that of any other rope used for the same jobs . . . even in the hands of inexperienced personnel! Its proven capabilities clearly suggest its use for all jobs where steel core ropes are normally used. See your Roebling salesman for all the facts or write Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey. Roebling Herringbone, the two-in-one rope to meet the doubly stringent demands of today's economy.

ROEBLING

Branch Offices in Principal Cities

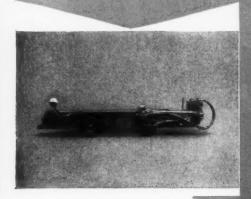
\*Reg. app. for

Subsidiary of The Colorado Fuel and Iron Corporation

WIRE ROPE

FOR STATIONARY AIR COMPRESSOR USERS ..

# THE ACME JUMBOLTER



Model



### FASTER AND EASIER!

Time studies have proven that under most mine conditions the ACME JUMBOLTER installs roof bolts 3 times faster than hand held machines.



### LET THE MACHINE DO IT!

The ACME JUMBOLTER takes the heavy lifting and hauling out of roof bolting. Finger tip control positions the stoper at any desired point. Two stopers will cover any point in a space 23' 10" wide without moving the JUMBOLTER. Arms reach 9' in front of the machine and swing 270°. No blocking is required for uneven top. Ample space provided to carry the day's supplies.

The ACME JUMBOLTER was designed to furnish a quick and easy method of drilling Roof Bolt holes where a mine is equipped with stationary or semi-stationary air compressors and having air piped to the working face. The unit is self propelled with full hydraulic drive and hydraulic steering. It is equipped with two Stoper Jumbo Arms and is complete with

Stopers and Dust Collectors. Cleveland Model S12V Straight or Telescoping Leg Stopers or Model S20 Stopers may be used. All equipment is Bureau of Mines Approved. Best operating Conditions in seams 42" to 108" high.

We will demonstrate in YOUR mine. For more detailed information write or call -



### **ACME MACHINERY COMPANY**

WILLIAMSON, WEST VIRGINIA

WAREHOUSE AND SALES OFFICE REPRESENTATIVES IN PRINCIPAL
MORGANTOWN, W. VA.
MINING AREAS



### **ROLL SEVEN – EVERY PASS**

Sevens pay off on the Iron Range, too, especially when made by a Marion 151-M.

This 7-yard machine continues to strengthen its reputation for steady, low-cost, dependable loading.

Here is stamina for the heaviest, hardest digging, with smooth, fast cycle time. Here is Ward-Leonard electric control with refinements that save on power costs and protect the machinery against shock and overload.

Let Marion mining specialists tell you about the work records being made in mining by the 151-M, and outline what it can do for you.



MARION POWER SHOVEL COMPANY

Marion, Ohio

A Division of Universal Marion Corporation

# More tonnage . . . more profits

50%
Higher
Tonnage
with the

new
CM37





Backed by the tried and proven cutting principle of the original Lee-Norse Miners, the CM37 brings a new high in operational efficiency to continuous mining. This <u>rugged</u> machine has more power, more capacity and higher tramming speed that results in increased tonnage per man shift.

### Check these NEW FEATURES!

- Total weight 25 tons—a 25% increase! Extra weight mostly in improved cutter head where it does the most good!
- More power—fewer motors! Only 3 identical electric motors used . . . conservative continuous ratings . . . no water cooling.
- Heavy duty electric control.
- 14" wide crawler treads with improved hy-

- draulic motor and gearing.
- 24" wide conveyor driven by hydraulic gear motors applied directly to gathering head. Hydraulic start and stop . . . no clutch required.
- Multiple tramming speeds—variable speeds to 50 feet per minute . . . fast tramming at 90-100 feet per minute.
- Increased capacity...4 to 5 TONS PER MINUTE.

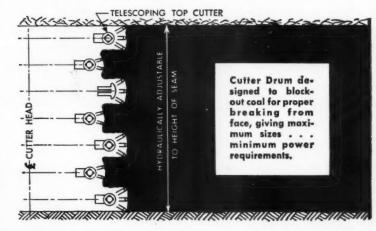
# ... with Lee-Norse MINERS



# Here's how LCM28 produces profitable tonnage!

- Weight 16 tons rugged and heavy enough to cope with tough cutting conditions.
- 2. Capacity-2 to 3 tons per minute.
- 3. Hydraulically driven 24" flexible Conveyor.
- 4. Two Cutter Heads cut a wide face 16 feet or less.
- Dual gathering arms have maximum reach of 11 feet... will gather ALL the coal regardless of position.
- Controlled Tramming Speed gives proper sumping action and Dual Pump combination gives high tramming speed.
- 7. Especially good in cross-cut developmenti

The LCM28 "Low Coal" Miner employs a new combination of cutting and gathering coal. The vertical mounted extendable cutter drums arc together like a "clam shell."



All Lee-Norse Miners are available in AC or DC power.



Lee-Norse Company

CHARLEROI, PENNA.

Specialists in Coal Mining Equipment

Lee-lowe MINERS keep production on the go!



# Abrasion in piping?

Here's how a big uranium mill solved it with "U.S." flexible rubber pipe



 Four 8" U. S. Pilot Pipes carry fine screened ore from secondary crusher storage bins. Four more pipes feed too-coarsely crushed aggregate onto a conveyor belt and back into the crusher. On both jobs, Pilot Pipe has lasted over 4 years.

In this severe service, quenched calcined ore pulp
 -50% solid—is pumped through these lengths of
 U. S. Pilot Pipe, from the roaster calcine pumps.

Where to get flexible piping that can stand up to severe abrasion without being chewed up?

Union Carbide's Uravan mill found the answer in U. S. Pilot® Pipe and Pinch Valves. In addition to the operations pictured above, these products handle the slurry on the 9 separate pumping stations of the counter-current decantation wash circuit, are used on the 2 booster stations between leach and tailings disposal plants and between the primary acid leach and roaster.

This pipe is specially built to handle abrasive materials, such as calcined ore, and corrosive materials, such as solutions containing sulfuric and hydrochloric acids. It is flexible, easy to install and won't build up. Its service life is longer than that of metal pipe.

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber product



**Mechanical Goods Division** 

# **United States Rubber**

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y.

In Canada: Dominion Rubber Company, Ltd.



# for high throughput or long life

Throughput and wear-resistance are two important factors that affect your choice of screening. And the one that is more important to you will determine the type of screening you choose: light wire screens with a large percentage of open area that produce higher tonnage per hour . . . heavy-wire, slow screening that lasts longer, minimizes downtime . . . or medium wire screens that combine some of the features of each.

(Both screens have

same size openings.)



ective Open Area 60



But whatever your screening problem—whether you need longer life for hard, extremely abrasive materials, or higher volume on standard jobs—there's a CF&I Screen that's right for you. CF&I offers a choice of:

Weaves: Double Crimp for heavy screens of low effective area; Lock Mesh for very accurate sizing; Flat Weave for least resistance to material.

Openings: Long Slot for relieving blinding or clogging conditions; Rectangular for maximum throughput.

Specifications: Complete range from .035" to 1" diameter wire size; from .063" to 6" clear opening.

In addition, all CF&I Industrial Screens are made from top quality carbon or alloy steel wire. Quality is carefully controlled from blast furnace to wire drawing and weaving operations, to ensure maximum resistance to abrasion, vibration and fatigue.

For prompt, dependable service or engineering assistance, contact the CF&I office nearest you.



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# SOMETHING NEW UNDER THE GROUND



# Revolutionary I-R "DOWNHOLE" DRILL

service-proved on millions of feet of hole, now available in FOUR SIZES, with constant, thru-the-bit hole cleaning!

The I-R DOWNHOLE drill is a rugged, heavy-duty, sub-surface percussion drill that delivers full striking power right at the bit. Hundreds of units, in operation all over the world, have drilled millions of feet of hole with outstanding records of performance and economy.

Designed for use with Ingersoll-Rand Drillmaster and Quarrymaster drilling rigs, the DOWNHOLE drill is also available to present users of other types



of rotary drilling equipment. Conversion from roller cone bits to **DOWNHOLE** drilling is simply a matter of screwing the drill to the rod or adapter and adding an air-line lubricator.

Here are some of the features that put the DOWNHOLE drill in a class by itself.

**PATENTED HOLE CLEANING.** All operating air is exhausted through the bit and additional *high-pressure air* blows continuously through the bit for maximum hole cleaning, even while drill is not running.

**RENEWABLE WEAR SLEEVE.** The entire unit is encased in a renewable wear sleeve that can be replaced at low cost when the outside diameter is worn down. (Patent Pending)

THREADLESS CARSET BIT DESIGN. The service-proved result of years of experimentation and field operation, it has no threads to strip or work loose and no energy loss through a separate connection.

**SEALED UNIT.** There are no ports in the outside of the drill which could admit abrasive material into the working parts.

**CHECK VALVE.** An optional check valve can be mounted behind the drill to permit operation under great heads of water—keeps mud and cuttings out of the machine even when the drill is stopped.

SPECIFICATIONS	DHD-275	DHD-325A	DHD-400	DHD-500
BIT SIZES	4¾" & 5"	6" & 6½"	7" & 7½"	9"
	4"	4" & 5"	5½"	7"
	52¾"	52½"	63¼"	68½"
OUTSIDE DIAMETER	41/4"	51/8"	6"	71/4"
	158 lb.	236 lb.	362 lb.	5861/2 lb.



For further details, send for a copy of Bulletin 4203.

Ingersoll-Rand

A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK

# **Another EUCLID product improvement!**

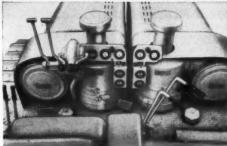


One of the reasons the new series Euclid TC-12 Crawler provides more work-ability with less down-time is the unequalled accessibility of all major components for quick, easy servicing.

As shown in the photograph, the two Donaldson dry-type air cleaners, one for each engine, are conveniently located for easy access. Both pre-cleaner and secondary filter can be serviced in a fraction of the time required for oil bath cleaners and there's no mess—just empty the pre-cleaner dust cup, clean and replace a paper element in the secondary cleaner.

### HIGH EFFICIENCY CLEANER INCREASES ENGINE LIFE

The Euclid TC-12 Crawler is now being built with the Donaclone dry-type air cleaner as standard equipment. This 99.9% efficient cleaner reduces engine wear caused by dust—increases the service life of the engine and helps maintain top operating efficiency. Engine manufacturers say that 8 ounces of



abrasive dust can ruin an engine in a short time. Because of the tremendous volume of air that passes through an engine in a single shift, the importance of air cleaner efficiency is obvious. That's why Euclid uses this Donaldson cleaner on the new series TC-12...it's another example of constant product improvement that makes Euclid your best investment.

**EUCLID** Division of General Motors, Cleveland 17, Ohio



# EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



# WHY BUY



# ONLY 2/3 OF A BELT?

...it's the Last Third of an R/M Conveyor Belt that Gives

for your "More Use per Dollar"



It's the *last* one-third of conveyor belt life that determines its final cost. Real conveyor belt cost is the cost per foot of belt in terms of load carrying capacity for the *potential* service life of the belt. R/M's new conveyor belt construction now assures you ½ longer belt life! Here's why:

R/M engineers recognize that every belt feature—troughability, resiliency, fastener holding ability, strength member fabric, cover toughness and thickness—help determine the true cost of Ray-Man Conveyor Belt on your job. And that's why every Ray-Man component is precision proportioned to assure better belt balance where it pays off most for you—in longer belt service life!

Let an R/M representative show you how extra life in the last  $\frac{1}{3}$  of conveyor belt service means "More Use per Dollar" with Ray-Man Conveyor Belt and other R/M heavy duty constructions.

### **RAY-MAN CONVEYOR BELT**

- Trains Naturally
- Resists Impact and Ripping
- Double Compensation Relieves Outer-Ply Stress
- Holds Fasteners
- Requires No Breaker Ply
- Exclusive "XDC" Long-Wear Cover
- Moisture Resistant, Mildew-Proof

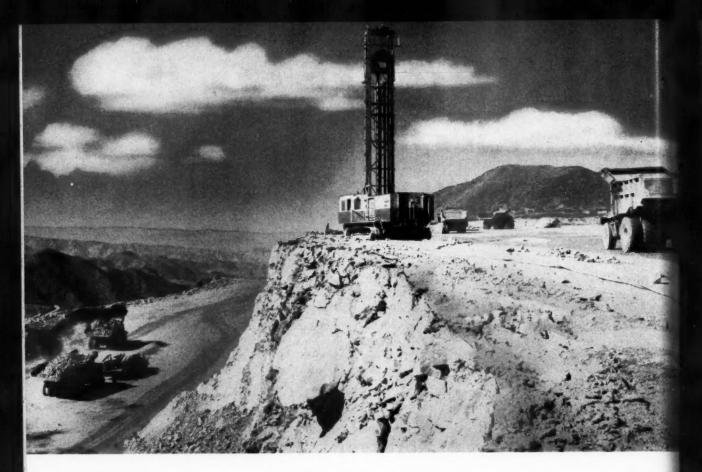
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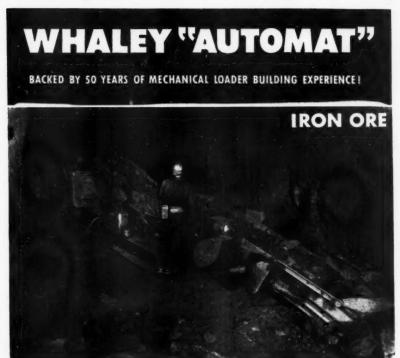
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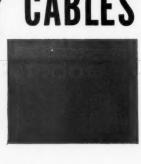


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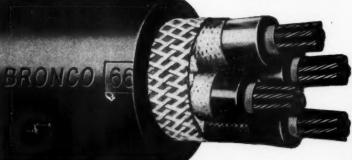
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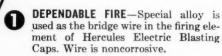
"Clean," simple design naturally means easier servicing, too. And you are always close to fast parts and service, wherever you are. Result: Allis-Chalmers engines are back to work quickly. See your dealer for the full story of Allis-Chalmers' dependability and economy. Allis-Chalmers, Milwaukee 1, Wis.

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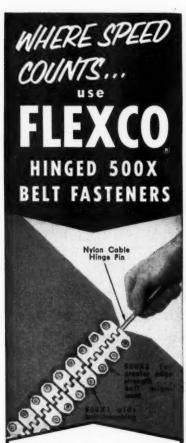
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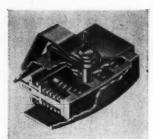
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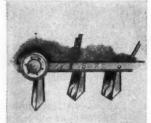
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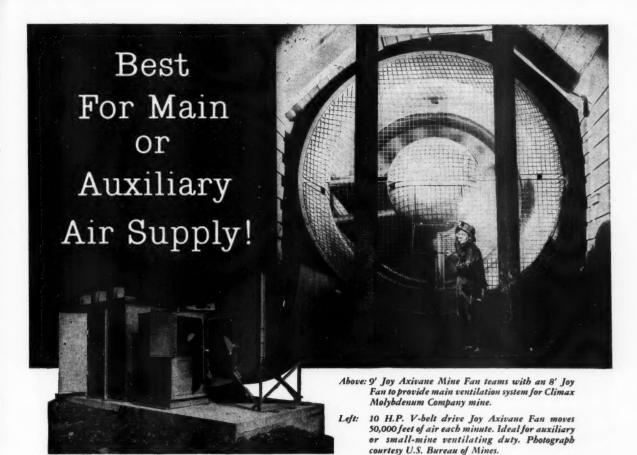
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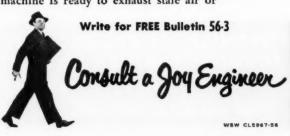
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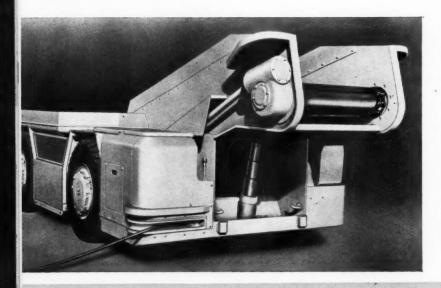
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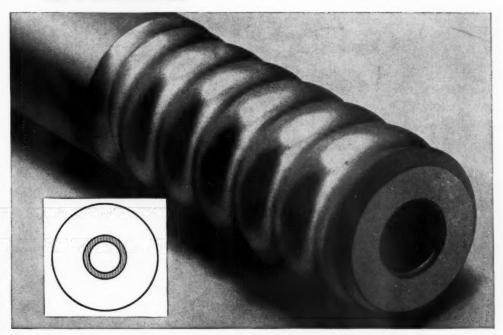
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### **EDITORIALS**

ROBERT W. VAN EVERA, Editor

NOVEMBER, 1958

#### HI JOE! WHAT'S NEW?

O N pages 46 to 69 of this issue is a report on the proceedings of the 1958 AMC Convention and Exposition in San Francisco. In summarizing the over-all atmosphere of the meeting, we would say that the prevailing (though not universal) attitude was one of optimism. This is a healthy situation.

In reviewing the operating sessions at San Francisco, our main reaction was that an exceptional amount of brand-new information came to light.

In this issue, for instance, an article based on the talks by Gerald W. Johnson and David D. Rabb describes the results of the underground nuclear blast set off at a test site in Nevada last year, and suggests possible applications in the mining industry. The potentialities of such nuclear blasts open up new vistas to forward-looking mining men.

New concepts in mineral benefication were brought out in C. M. Marquardt's talk on automation, and in the discussion of "New Trends in Plant Design" by R. T. Lassiter and J. H. Jensen. We are only at the threshold of advances along these lines that could, in the next several years, be spectacular. A. W. Fahrenwald gave a progress report on a revolutionary approach to grinding—a gyratory ball mill—the development of which will be watched with special interest. William L. Lenneman's talk on uranium ore processing showed that refinements in uranium metallurgy are taking place at an everincreasing rate.

In the field of iron ore treatment P. E. Cavanagh, of Montreal, told of the successful operation of a pilot plant in which dry grinding and magnetic concentration of iron ore are used in place of the conventional wet processes, with the prospect of a substantial reduction in cost. Roger E. Barthelemy and J. Hall Carpenter reported on the use of high tension separators, setting forth for the first time the capabilities as well as the limitations of this method.

Notable developments in filtration were discussed by Robert B. Thompson. Among these are improved results through precise use of flocculating reagents, new mechanical design of filters, application of the air purge system, and other cost-cutting innovations.

As to mining techniques, the report on long-wall stoping at the Radon mine by William H. Love and Philip M. Lindstrom gave a full description of one of the newest applications of a coal mining method to a metal mine. Robert W. Braund reported on a steel raise liner, developed at Jones and Laughlin's operations in Michigan, which greatly facilitates maintenance of the ore passes used in sublevel caving. The freezing methods used by Potash Company of America to sink a new shaft in Saskatchewan, as described in detail by Joseph B. Cummings and Russell G. Haworth, include some important refinements over past work in that field.

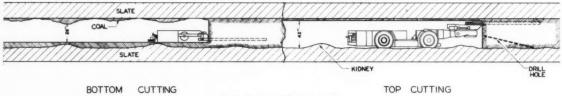
The successful use of prilled ammonium nitrate in underground blasting was reported by Joseph B. Elizondo of the Eagle Picher Co. There are "pros" and "cons" to this technique, but its possibilities are intriguing, and the cost-cutting potential of this inexpensive blasting agent has captured the industry's imagination.

More on blasting, in open pit mining, came from H. E. Farnam, Jr. who described the use of a slurry of 65 percent AN, 20 percent TNT, and 15 percent water which can be pumped into the hole. Frank Quilici described the methods used to cut costs in shooting wet holes with AN at Kennecott's open pit operations in Nevada.

In the field of exploration, V. N. Burnhart described new tools which are helping the industry to attain greater efficiency and lower drilling costs.

W. M. Peirce's talk on "The Role of Research in Marketing Metals" told of the brand-new research program sponsored by the American Zinc Institute and the Lead Industries Association, giving his audience a clear idea of the objectives of that program. Along the same vein, R. H. Thielemann reported on research for new uses for mineral products, pointing out a number of unexplored areas where markets for mineral products might be found.

These illustrate only a small part of the progressive evolution in equipment and techniques that came to light at the convention. It was abundantly clear that the industry is very much on its toes in seeking new and better ways to extract, to process and to market its products. The American Mining Congress is proud of the part played by its conventions and its publications in communicating these developments to the industry.



Effect of top and bottom cutting

# HIGH PRODUCTION IN THIN SEAM MINING

Small crews . . . all-conveyor haulage . . . top cutting with rubber-tired cutting machines . . . a-c power . . . new mine projection—these ingredients spell out Tioga Coal Corporation's approach to thin seam mining. It is an approach that has resulted in higher production and safer working conditions

By J. L. McQUADE

President Tioga Coal Corp.



THE scene for this article is the Tioga seam of high quality metallurgical coal from large reserves in Nicholas County, W. Va. The seam varies between 38 and 42 in., and the top is brushed for belt haulage as well as for mantrip cars.

Tioga Coal Corporation's approach to thin seam mining differs from that of most companies engaged in thin seam mining in that (1) a rubbertired cutting machine is used with Piggybacks and conveyors and (2) top cutting is the general practice. The section is operated completely on 440-volt a-c power.

A rubber-tired cutting machine is not completely new in thin seam mining, but it is believed to be new when used with Piggybacks. Top cutting is not entirely new either, but it, too, is newer on a Piggyback section and has shown some interesting and profitable top control that is very

important in Tioga's case. A-C power is not new, nor is it new at Tioga. The company has been mining coal for some 15 years and considers itself one of the pioneers of a-c power in West Virginia.

#### All-Conveyor Haulage and A-C Power

A-C power did not become respectable in West Virginia until after the use of ground trip. However, Tioga has found that the advantages it enjoyed in conveyor mining with a-c power are also enjoyed in mining with Piggybacks and loading machines. Maintenance is considerably less than a similar section would be on d-c power, and the company saves for production the time that would be required for maintenance on d-c equipment.

In its other companies Tioga has a

background of many years operation of all-conveyor, a-c mines. For example, Donegan Mines operates in a total seam thickness averaging less than 30 in. and frequently mines substantial areas of coal as low as 24 in. The method of mining at Donegan is hand loading onto face conveyors. Despite the obvious disadvantages of the very thin seam and hand loading, over-all tons per man in this operation are favorable. Management is convinced that the elimination of nonproductive labor, by using an all-conveyor haulage system, and the relatively trouble free operation of the conveyor equipment powered with a-c, and having virtually no outages, are responsible for this performance. Incidentally, over 2,000,000 tons of coal have been produced without a fatality at this mine, evidence of why Tioga is convinced of the safety advantages of all-conveyor mining with a-c power.

All-conveyor haulage and a-c power is the foundation of Tioga's mining psychology.

Piggyback units are now producing more coal than Tioga used to average with continuous mining units or hand loading conveyor units. The selection of conveyors and Piggyback instead of shuttle cars for production units is logical and consistent with an all conveyor mine. Management's observations and studies indicated that a faster rate of advance was possible with this continuous haulage system of mining than with any other method. This follows naturally from the fact that once the loader starts loading in a cut there is no interruption in transportation until the cut is loaded out. In Tioga's case, an individual cut in a 20 ft wide place can be loaded out in ten minutes.

#### Problem of Crossing Center Place

A challenge existed in this mining method in how to balance the cycle of roof bolting, face drilling, cutting and shooting to keep the loader loading. Observations indicated that this seldom has been done in high capacity conveyor sections. Most Piggyback installations that Tioga observed operated in only two places and were thus handicapped for working room and were further handicapped by slow cutting machines. Installations observed with three places involved either crossing the pan line in the center place or tramming around it. Both methods of crossing the center place involve extra time and other problems.

Tioga selected the latest type high speed mobile rubber-tired cutting machines as being best able to cut as fast as the loader could load. It was decided to operate in three places, and a technique has been developed which solves the problem of crossing the center place simply and effectively.

The mine's approach to crossing the center place is to keep the conveyor tailpiece back of the last open break-

through. In order to work out the system management obtained from the Long Co. a special Model PT-218 Piggyback. Forty ft long, it is 12 ft longer than the popular Piggybacks which have been used in the past. With the PT-218 Piggyback and the Long Model 88 Pigloader, 17 ft long, the reach is more than 50 ft from end of conveyor to face at all times. With breakthroughs spaced every 371/2 ft, the mine always has an open breakthrough ahead of the conveyor tailpiece. The simple procedure of leaving a runway open across the face of the center place has been entirely successful and effective, with no difficulty experienced with the extra length Piggyback conveyor.

It was learned, however, that a second important step was needed to make this system work; the outside places should be carried at least two cuts ahead of the center place. This is needed so that when the breakthroughs are made in the center place they are immediately usable for tramways. After working out the system involving the extra long Piggyback in the center place, with breakthrough centers to suit and carrying the outside places two cuts ahead, the three-place mobile cutting Piggyback section has operated successfully on a three-shift basis with no transportation delays.

#### Up to 20 Cuts per Shift

A seven-man face crew is used: two loading, two bolting and drilling, two cutting (machine helper is shot fireman) and one pan-up man. With this crew about 48 to 50 cuts are averaged, each 7½ ft deep, every 24-hour period, with good shifts producing up to 20 cuts. During the several months Tioga has had these units in operation, improvement has been continuous and the company looks forward to substantial gains in the future.

As emphasized above, since loading is accomplished with a five tpm loading machine, with no transportation delays behind it, the problem is to try to put the coal on the ground fast enough to keep the loader working most of the time.

The cycle goes something like this. When the loader has cleaned up the right hand side of the cut the roof bolter moves in and starts bolting. The mine is currently installing a roof bolter with hydraulic hand-held drill attached so that a two-man crew will work together to perform roof bolting and face drilling simultaneously. It takes about 12 to 15 minutes to cut a place and about five minutes for the cutting machine to tram into position from the last place, so that the roof bolting and face drilling crew has about 15 minutes to complete these operations without delaying either loading machine or cutting machine whatsoever. This leaves the third place free for shooting and smoke to clear. The cycle varies somewhat when breakthrough cuts are included, but the balance is about the same and management can see no benefit or necessity in more than three places.

Piggyback production units are presently being operated only in entries. These entries are advanced at the rate of approximately 70 ft per day, which is giving the company the fast development it needs. Mains are being driven in the direction of the largest reserves and, incidentally, entries are projected from these mains to the outcrop at fairly regular intervals to minimize problems such as ventilation, supply handling, portal time, a-c power distribution, etc.

Production has been discussed in terms of number of cuts and the number of feet advanced. The difficulty that any thin coal producer faces is that about the same effort will produce proportionately more tonnage in higher coal. Similarly, Tioga knows that it will have a better chance to keep the loader busy and to balance its cycle when it gets into the





(Left) An individual cut in a 20-ft wide place can be loaded out in ten minutes. (Right) The Tioga mine is currently installing a roof bolter with hydraulic hand-held drill attached so that a two-man crew may work together to perform roof bolting and face drilling simultaneously

wider faces which will come with room work.

#### Why Top Cutting

There are some interesting special problems connected with mining at Tioga which have dictated the general practice of top cutting. Much of the coal is overlaid by a bone 6 to 18 in. thick. In the company's experience with bottom cutting, if the bone is exposed to air the only way that it can be held is by posting on extremely close centers. Bolting has not been satisfactory with bottom cutting.

Another problem is that the coal clings to the bone. When the coal is bottom cut, the tendency of the coal to cling to the roof, results in an irregular top. Working height is reduced to about 24 in. in some places.

Still another problem is that the bottom is irregular in many parts of the mine, with hard, boulder-like projections penetrating six to eight in into the coal seam. With bottom cutting, machine men strive to stay above these boulders, locally called "kidneys," with the result that they leave an average of six to eight in of good coal on the bottom.

Thus, the combination of coal clinging to the roof and machine men cutting well above the bottom resulted in the loss of a substantial percentage of the approximately 36 to 42 in average seam height.

Top cutting has proved a successful answer to this problem. Cutting coal just below the bone has made it possible to hold the bone with a combination of roof bolts and timbers and still maintain an adequate runway for the mechanical equipment. Even though a little coal is being left at the top, it is only a small percentage of that left when bottom cutting was employed. Shooting near the bottom dislodges the coal from the bottom and even where the "kidneys" occur, the loading machine is able to pick up virtually all of the coal. As a result, with top cutting and mechanical loading the company is able to realize virtually the entire seam height.

Top cutting is not currently practiced in sections of the mine where the coal is overlaid by good slate top and where the irregular bottom conditions described above do not prevail. Bottom cutting with universal ma-chines eliminates the problem of bugdust against the face covering the shot holes. When a place is bottom cut, holes are drilled near the top and remain exposed. When top cut, holes are drilled from the center-angling towards the bottom - and machine cuttings cover these holes so that some of the cuttings have to be moved prior to shooting the place. As a result the mine is able to pick up two to three cuts a shift when it bottom cuts instead of top cuts. Tioga hopes to ultimately improve its tech-



Top cutting has shown interesting and profitable top control advantages at this

West Virginia mine

nique with top cutting so that there is no lost production when comparing top cutting to bottom cutting. Management does anticipate that the bulk of its property should be mined by top cutting.

#### Moving Conveyor Set-Ups

Moving conveyors is of course an important part of the mine's system. Advancing at the rate of about 70 ft a day, crews move up every 300 ft

and no special time is set aside for moving. When 300 ft of advance is reached, the crew which happens to be working does the moving. The last time a move occurred, the crew doing the moving completed the move and produced nine cuts of coal on the same shift.

Conveyor equipment includes one mobile self-propelled conveyor head, which is a distinct advantage in moving. Experience with this mobile



Conveyor equipment includes one mobile self-propelled conveyor head, which is a distinct advantage in moving

unit as compared with skid mounted units will lead to further purchase of mobile units in the future.

#### Equipment for Handling Supplies, Personnel

Main line belts are paralleled by a supply track on which the mine also runs mantrip cars. Supplies are handled on track to the head of the panel belts. From that point both men and supplies are handled on the belt itself. The company now has a lightweight battery personnel car which is finding good use on one of the sections handling supplies from belt tail to faces. If success with this experimental unit continues, management hopes to extend the use of battery rubber-tired supply and personnel handling equipment on the sections.

#### 19 Tons per Faceman Under Tough Conditions

Timber is essential in this particular seam because roof bolts do not reach into the very firm top some five ft above the coal seam. Both timber and roof bolts are used. Roofwall machine, and it is almost an impossible seam to mine with continuous mining machines. The boring type machine will not penetrate this seam at a rate that is economical and the cutter type of continuous mining machine becomes a very high maintenance unit because of vibration. Also, either of these machines—being heavy—disturbs a soft bottom.

From January 1 to March 31, 1958, production averaged 19 tons per shift per man at the face. This included all the moving and supplying done on these two sections. However, management is not completely through with its experimenting. There are at least two things that Tioga has immediate two things that Tioga has immediate plans for. Using a lower cutting machine, better known as a 12-RB, is one. At present the mine uses two men on roof bolting, which is believed unnecessary. One of these men will be eliminated by using a newer and more modern piece of equipment.

#### Summary

Piggyback sections have accomplished this for Tioga: they have greatly increased production over what the mine was able to do by hand load-

ing on conveyors; they have allowed better control of top and safer working conditions; they have permitted management to concentrate its mining, and have better and less supervision.

The writer has not attempted to say that anyone can find any advantage in mining thin coal versus thick coal. So far as costs are concerned, with modern methods face labor costs and production rates are likely to be directly proportional to the height of the coal mined. To mine thin coal successfully, costs other than face labor costs must be kept to a bare minimum. Undisputably this means (a) modern and efficient cleaning plant; (b) a well-balanced haulage system, preferably all belt with surge capacity; (c) no excursions of fancy on such matters as a-c versus d-c power-a-c costs are undisputably lower; (d) sectional production units which "fit" the over-all picture, giving maximum usage of the conveyor system and minimum surging; (e) no limitations on loading but the practical provision for uninterrupted maximum capacity loading whenever coal is on the ground in front of the machine.

When these considerations are met it may very well be that the only cost disadvantage in mining thin coal is in face labor itself. If the thin coal is mined efficiently, the difference in face labor costs will represent only a small fraction of the price of the coal as paid by the consumer. On this basis, the bulk of future mining in much of the United States will inevitably be in the higher quality thinner seams.

(Left) A lightweight battery personnel car handles supplies from belt tail to faces in one action. (Below) A 40-ft long Model PT-218 Piggyback. All-conveyor haulage and ecpower is the foundation of Tioga's mining philosophy



bolting has been found helpful but it is not a cure-all for this type of top. The mine must timber in conjunction with its roof bolts and must especially use timbers in the center of the place, and it is customary to back the Piggyback on the tailpiece in the outside places rather than push it back on the runway.

the runway.

At the Tioga mine it was the normal procedure to shoot with compressed air. Because of limitations in height and because of the blockiness of the coal, it was found more practical and profitable to use permissible explosives rather than air.

This seam of coal is a high quality coal that has an extremely hard structure, but is not abrasive. It is a very difficult seam of coal to cut with a short



## AMMONIUM NITRATE BLASTING—

# Underground

By JOSEPH B. ELIZONDO

General Superintendent of Mines Tri-State Mines The Eagle-Picher Co.

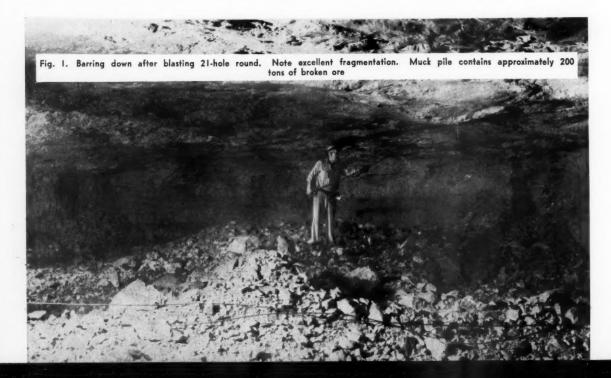
Initially regarded with some skepticism, the use of prilled ammonium nitrate (fertilizer grade) has become standard practice at Eagle-Picher's John Beaver mining unit. Although its use is in the preliminary stages of development, all indications point to safer and lower cost blasting

THE substance of this article is based on approximately three months test work using prilled ammonium nitrate at one of Eagle-Picher's underground mining units located in the Tri-State District. It was originally planned to include data from several months run in support of lower breaking costs, but all such work was temporarily suspended due to a general shut down of operations on July 3rd. The ensuing remarks are therefore limited to test work and observations that were completed prior to this shut down, with a hint as to possible savings.

The use of prilled ammonium nitrate as a blasting agent has become generally accepted throughout most phases of open pit and quarry operations; however, until recently, operators have been reluctant to use it in underground mining. This is probably due to the reported toxic nitrogen-oxygen gases produced during detonation, coupled with unreliable results when used in small diameter drill holes. This argument certainly must not be taken lightly. However, under certain conditions underground applications are entirely practicable.

Analyzing the "pros" and "cons" a bit further it can be reasoned that the toxic gas problem would be greatly minimized if the underground blast area were well ventilated, especially if the mine operated on a one-shift basis. The literature (Cooley, C. M., "Properties and Recommended Practices for Use of Ammonium Nitrate in Field-Compounded Explosives," Technical Bulletin No. 95, Missouri School of Mines and Metallurgy, Rolla, Mo.) states that when ammonium nitrate is mixed with fuel oil in the proper proportions and correctly primed, excellent results can be obtained in two and three-in, diam blast holes. The prills must, however, be kept free from water because they are readily soluble.

The zinc-lead mines in the Picher Field of Oklahoma and Kansas seemed to fit most of these requirements. The underground areas are essentially dry and, due to their interconnected nature, are easily ventilated. Eagle-Picher operations



are also run on a one-shift basis—with a 16-hr interval between shifts. The majority of the holes average  $2\frac{1}{2}$ -in. in diam and are drilled 10 ft deep. This all added up to a set of conditions that appeared very favorable for experimentation.

#### Preliminary Tests Show Method Feasible

After permission to start testing was granted, the first problem encountered was how to introduce the free-flowing ammonium nitrate prills into the drill holes. The drill rounds incorporated either a slab or burn type cut and were drilled in a horizontal direction. It was, therefore, thought advisable to put the prills into paper shells and load them in the same manner as dynamite cartridges.

Pre-waxed 1% by 16-in. cylindrical paper shells were obtained with one end crimped shut. Preparation steps were simple. The prills were mixed with No. 2 diesel fuel, using one gal of fuel per 100 lb of ammonium nitrate. Thorough mixing was accomplished in a small handrotated wooden barrel. The prills were then poured into the paper shells and compacted by means of an up and down jarring motion. After the open ends were crimped, remarkably rigid, 1%-lb cartridges resulted.

All test work was conducted underground in the John Beaver mining unit which provided a variety of conditions involving rock breakage. The mining faces were located in flatlying chert beds that contained varying amounts of limestone, dolomite, calcite, sphalerite and galena with numerous small caves and vugs. Back heights varied from eight to 12 ft with pillars spaced every 30 to 60 ft. Holes were drilled with jumbo mounted 4-in, drifters using 2%-in.

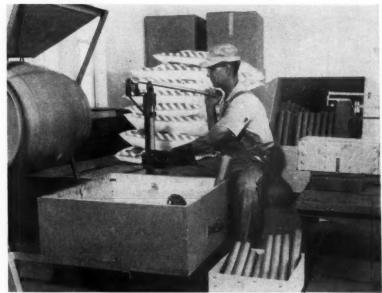


Fig. 2. Crimping 13/4 by 16-in. cartridges of prilled ammonium nitrate. Note rotating mixing barrel in left foreground

tungsten carbide insert bits and 1%-in. low carbon round drill steel. The burden on each hole was approximately four ft both vertically and horizontally.

Experimentation in loading and shooting the holes proceeded on a trial and error basis. Various arrangements and ratios of booster cartridges to prill cartridges were tested, but it soon became apparent that a booster had to be placed between every second cartridge of ammonium nitrate to insure consistent results. It was also found that uncoated prills used in place of coated prills increased the sensitivity of the ammonium nitrate. All cartridges were slit prior to loading and

then tamped in the normal manner. The holes were detonated by means of No. 6 blasting caps and safety fuse, with "Ignitacord" used to tie in the round. Resultant breakage and fragmentation was, for the most part, good. However, in some rounds, "boot-legs" and partial missires resulted. Close inspection of this condition disclosed the presence of small caves which apparently allowed the gases produced from the explosion to escape.

The company industrial hygienist tested for the presence of carbon monoxide, in areas relatively confined, 16 hr after several rounds of ammonium nitrate were exploded, but it was never found to be present in

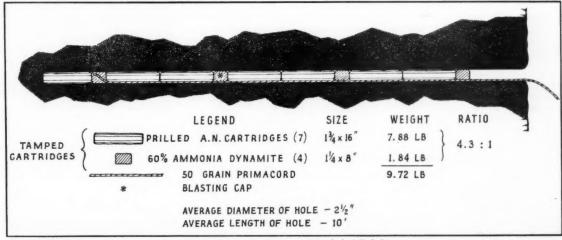


Fig. 3. Schematic diagram of loaded drill hole



Fig. 4. Loading 2½-in. diam drill holes in underground heading. The boxes from left to right contain cartridges of prills and 60 percent dynamite boosters. The photograph also shows "Primacord" laced through 60 percent booster cartridges in the left foreground, and safety fuse and detonating cartridges to the right

amounts greater than 0.005 percent. In areas where ventilation was normal, the gas was not detected. As a matter of interest, the same areas were checked for carbon monoxide after blasting with 65 percent ammonia dynamites and the results were almost identical. It was also noted that fumes emitted from the muck piles had an odor resembling gunpowder, but there were no ill effects—such as headaches or nausea—as is experienced from dynamite.

#### Primacord Eliminates Difficulties

Experimentation which began April 1, 1958, showed sufficient progress that by June ammonium nitrate was assigned to the John Beaver mining unit for general use. Normal dynamite consumption at this unit averaged 364 lb per shift, with a powder factor of 1.15 lb per ton. Estimates indicated that approximately half of this dynamite could be replaced with prilled ammonium nitrate. Therefore, it became necessary to increase the production of ammonium nitrate cartridges above that which had formerly been used for experimental purposes. A 55-gal wooden mixing barrel was constructed so that 100 lb of prills could be rotated at 30 rpm by means of a 4-hp electric motor. A hand-operated crimper (figure 2) was also utilized to step up production.

With more extensive use of ammonium nitrate, the problem of "bootlegs" and partial misfires became annoying, and as a result, experimentation with "Primacord" was begun. It soon became apparent that

this form of detonating fuse containing a high explosive core of PETN held the solution to the problem. The procedure of loading the hole remained the same, except that a length of plain type 50-grain "Primacord" was laced through the first 60 percent booster cartridge and strung out in the hole so each successive booster came in contact with it. All boosters then detonated more or less simultaneously, eliminating the one-direction chain type of propagation between boosters that took place before the primacord was used. (See figures 3 and 4.)

This change appeared to eliminate all difficulties and inconsistencies previously experienced. Drill rounds, containing up to over twenty holes, were then shot with excellent fragmentation and with no "bootlegs" or partial misfires resulting. (See figure 1.) The ratio, by weight of prilled cartridges to booster cartridges, was 4.3 to 1, with 9¾-1b of combined explosives used per hole. This was approximately the same as the amount of 40 percent ammonia dynamite used per hole before prilled ammonium nitrate was introduced in the mine.

#### Results Point to Lower Blasting Costs

The underground application of this form of blasting agent was initially regarded with some skepticism, but this attitude quickly changed as progressive steps were made. As with any change in method or procedure, the personnel involved had to be sufficiently trained—as well as convinced of its merits.

The net savings per ton of broken ore cannot be substantiated at the present time, due to insufficient statistical data. The one month trial run at the John Beaver did not lower the explosive costs, due to general inefficiency coupled with continuous experimentation.

Prilled ammonium nitrate cartridges, according to estimates, can be produced within our organization for under \$8.00 per cwt. This would provide a cost of \$1.47 per loaded drill hole—\$0.32 of which is for the 10-ft length of "Primacord". Thus, a savings of approximately \$0.50 per hole would result. If this form of explosive is used in place of half our normal consumption of 40 and 65 percent dynamite, a savings of \$0.04 per ton of broken ore is possible. This would lower the average explosive cost, in all company mining units, from \$0.19 to \$0.15 per ton.

Further expansion in the use of prilled ammonium nitrate throughout other units of the company is pending the re-opening of operations. Many additional problems are anticipated; however, this type of explosive has every indication of providing a means of lowering breakage costs in underground mining operations in the Tri-State District.

#### ADVANTAGES

- Requires little capital investment to set up necessary equipment for production of prilled ammonium nitrate cartridges
- Lowers breakage cost without sacrificing fragmentation or raising the powder factor
- 3. No headaches or nausea as experienced with dynamite
- Not cap sensitive, therefore high degree of safety in processing and handling, provided normal precautions are taken

#### DISADVANTAGES

- Limitations as to minimum size of drill hole in order to insure reliable results
- Cannot presently be used in conjunction with water or in holes steeply inclined upward
- Requires two types of cartridges, plus "Primacord" to load a drill round
- 4. Lengthy underground storage in high humidity is not advisable, due to solubility of the uncoated prills

(Ed. note: The reader is urged to review "Blasting With Ammonium Nitrate" in the July 1958 issue of Mining Congress Journal.)

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# Another Highly Successful AMC Convention and Exposition

WITH an attendance greater than ever before, the American Mining Congress Metal Mining-Industrial Minerals Convention and Exposition in San Francisco, the week of September 22 afforded miners an opportunity to view the largest exhibit of mining equipment yet held and provided them with the latest information on all phases of the industry from many of the nation's top policy makers and mining officials. Mine operating men and others interested in mining from all over the United States as well as from many foreign countries showed intense interest in the splendid displays which filled the New Civic Center Exhibit Hall, the Arena and corridors at the Civic Auditorium and the street in front of the Auditorium—where good fellowship as well as dead-serious inspection and study of

the exhibits continued unabated from the time the Show opened Monday morning until it closed Thursday afternoon.

Some 19 convention sessions, fewer in number than in former years, but undiminished in the quality of the presentations, had been arranged by the Program Committee composed of industry leaders from all branches of mining. The committee, under the chairmanship of Frank Coolbaugh, vice president, Climax Molybdenum Co., made sure that important matters of national and industry policy, as well as all phases of operations, were covered so as to give mining people the most up-to-date information on whatever aspect of the industry interested them. A brief résumé of each session is given in following pages of this report.



Chairman John D. Bradley presided at the Western Board of Governors Meeting

#### **EXHIBIT FLOOR ACTIVITIES**

THE Exposition, sponsored by the AMC Manufacturers Division under the chairmanship of Jack H. How, president, Western Machinery Co., was truly impressive, with 193 companies occupying more than 110,000 net sq ft of exhibit space. This year's Show was certainly the most varied and complete display of mining equipment ever staged. Much effort, time, and expense were put forth by the manufacturers in showing the industry the latest in mining machinery, supplies, and services that are available to streamline operations today. Full-sized digging, hauling, drilling and auxiliary items were displayed, along with intricate working models and graphic illustrations of some items that could not be transported to San Francisco.

Manufacturers representatives were justly proud of the excellent machinery and equipment which they showed and enthusiastically explained to the thousands of mining men who were continually making the rounds. Many of the exhibits displayed items which had not previously been on the market - thus giving operators a chance to see equipment which they would not find in any operating mine up to this time.

#### **OPENING SESSION**

THE assembled mining men were warmly welcomed to San Francisco and California when the meeting was formally opened Monday morning.

Following an invocation by the Very Reverend C. Julian Bartlett, Dean of Grace Cathedral in San Francisco, Chairman John D. Bradley of the Western Division of the American Mining Congress pointed out that the meeting would exceed all previous ones in attendance, interest and the size of the Exposition. He said the large attendance reflected "the deep and growing concern of mining men with the perilous circumstances under which many branches of our industry are operating today and the problems which confront us."

Mayor George J. Christopher expressed the fondness of San Franciscans for mining people, pointing out that the history of the city is steeped in mining lore. He made it plain that what is good for the mining industry is good for the nation as a whole and wished the industry well in its convention deliberations.

A hearty welcome to California was extended by Governor Goodwin J. Knight. The Governor pointed with pride to his mining background, and then expressed regret at the present economic state of certain branches of the mining industry. He outlined the actions taken by the last session of Congress in the mineral field and expressed disappointment that some major problems of the industry had not been met.

Mr. Bradley then introduced President Howard I. Young of the Mining Congress. He told the audience that Mr. Young's public service in Washington, and his leadership of the American Mining Congress for twenty-five years, "have won him the respect and affection of the entire mining fraternity," and said that Mr. Young is retiring at the end of this year after "welding together the various branches of the industry into a strong organization which is consistently striving to obtain constructive mineral policies." Mr. Young was given a rising ovation in appreciation of his leadership and devoted service to the industry.

President Young expressed his appreciation of the ovation, and thanked the industry for the splendid cooperation it had given to him and to the Mining Congress during the past twenty-five years. He complimented AMC executive vice president Julian D. Conover and the staff of the Mining Congress for the outstanding job they have done. He went on to say that even though he was retiring from the presidency, he would continue to stand "ready to do any job for the mining industry, regardless of how humble."

Other officials of the American Mining Congress, including Program Chairman Frank Coolbaugh, Manufacturers Division Chairman Jack How, and Coal Division Chairman L. C. Campbell, expressed appreciation of the warm welcome to California and to San Francisco. They commended the fine program arranged for the meeting and the splendid array of exhibits, and praised the service of the American Mining Congress to the mining industry. Coolbaugh paid special tribute to the members of the program committee who had worked so hard to make the metting a suc-

Distinguished members of Congress, high Government officials and directors of the American Mining Congress who were seated on the platform were then presented to the audience.



Attentive crowds were on hand at the 19 convention sessions

#### SECRETARY SEATON REVEALS LEAD-ZINC QUOTA PLAN

IGHLIGHT of the opening session was an address by Fred A. Seaton, Secretary of the Interior, who sounded a note of confidence that "the American economy has again revived and will prosper and climb to heights far greater than any it has reached in the past." This would, he said, "in the end, mean busy mines."

He reviewed the history and problems of the domestic minerals industries since World War II, concluding with the defeat in Congress earlier this year of the Domestic Minerals Stabilization Plan which he had proposed. Following this defeat, Seaton said, the President and his advisers had been carefully studying the Tariff Commission's findings and recommendations in the lead-zinc escape clause case initiated last year.

He then revealed, simultaneously with an announcement from the White House, that "the President has concluded that the condition of the domestic producers permits no further delay in taking remedial measures. He has therefore decided to establish a quota, allocated by countries, limiting lead and zinc imports to 80 percent of average annual commercial imports during the five years 1953-57. These limitations, representing a 20 percent reduction from the level of average annual imports during those years, should be of real benefit to the lead and zinc industries, and that benefit should increase as our economy moves upward.

"... The imposition of quotas is, of course, an unusual step. Nonetheless, the Administration believes it is better suited than a tariff increase to the unique circumstances of this case and more likely to lead to enduring solutions beneficial to the entire lead and zinc industry..."

Seaton assured his audience that "as long as I am Secretary of the Interior, I shall continue to search for sound and sensible measures, within

the limitations of the authority granted by the Congress, to strengthen America's mining industries. I shall continue to seek the advice of members of the industry and try to work out with them programs on which we can unite for action."

#### DECLARATION OF POLICY

STATEMENTS setting forth the industry's position with respect to national policies which affect mining were introduced by the Resolutions Committee, headed by Kenneth C. Kellar of Lead, S. Dak. These statements had been carefully reviewed and coordinated into an overall Declaration of Policy, expressing in concise and unequivocal language the considered views of the mining industry.

This policy declaration is one of the most important pieces of work done at AMC conventions. It serves as a guide for the work of the American Mining Congress, and it gives wide publicity to the industry's problems and the policies needed to permit continued efficient operation.

The "planks" of the declaration

were presented at appropriate sessions during the meeting and were endorsed without qualification by the convention. The full declaration as adopted follows on pages 50 to 57.

#### SECRETARIES' BREAKFAST

ON Sunday morning preceding the convention, representatives of State and District mining associations met to discuss problems of mutual interest. Charles F. Willis, secretary, Arizona Small Mine Operators Association, served as chairman.

Earl F. Hastings, member of the U. S. Securities and Exchange Commission, addressed the group and discussed SEC regulations, particularly with regard to initial stock issues totaling not more than \$300,000. He explained that in the case of these small issues the Commission does not pass on the merits of the issue, but merely requires dissemination of certain limited information. Other mat-ters of common interest to the State Associations were discussed, including particularly the forthcoming field hearings on the proposed National Wilderness Preservation System which is actively sought by conservation groups.

#### STRATEGIC MINERALS LUNCHEON

A STRATEGIC Minerals luncheon on Wednesday was presided over by S. H. Williston, chairman of the Strategic Minerals Committee of the American Mining Congress.

Guest speaker was Senator Henry C. Dworshak of Idaho, who declared that the domestic mining industry "is now facing the inevitable payoff" on the "one-way 'reciprocal' trade program." He said he was astounded to learn that some \$240 million had been spent by various agencies of the United States government in promoting the expansion of metal and mineral production throughout the Western world in recent years. The result of this expenditure, he added, is



Senator Henry C. Dworshak, guest speaker at the Strategic Minerals Luncheon was introduced by chairman S. H. Williston

"persistent low-cost competition" from minerals produced abroad.

In commenting on the defeat of the minerals stabilization bill in Congress earlier this year, Dworshak said he was not prepared to give up the fight for a domestic minerals policy in view of the "red ink and unemployment" that plague western mining, despite the reversal in the last Congress. "It's not too late to save the domestic minerals industry and to provide a bulwark for our national defense," the Senator asserted.

#### BOARD OF GOVERNORS LUNCHEON

THE Board of Governors of the Western Division of the Mining Congress met at a luncheon on Thursday, September 25, with Chairman John D. Bradley presiding.

Members of the Board for the coming year, as nominated by the various State mining organizations, were unanimously elected.

Robert S. Palmer, executive secretary, Colorado Mining Association, reiterated that State's pleasure at the Mining Congress' plans to hold its meeting in Denver next year. He explained that additional hotel facilities will be available and that mining men can expect a most cordial welcome. On nomination by Frank Coolbaugh, the Board then elected Cris Dobbins, president, Ideal Cement Co., Denver, as its chairman for the coming year. In this position he will take an active part in developing plans for the 1959 Metal Mining and Industrial Minerals Convention which will be held in Denver September 14-16.

Louis Gordon, secretary of the Nevada Mining Association, expressed his State's appreciation at the selection of Las Vegas for the site of the 1960 Mining Show. He introduced John McDonald of Las Vegas, who said that about 90 percent of the convention hall facilities had now been completed and that the new exposition hall will be fully completed by the end of this year. He also pointed out that plenty of hotel accommodations will be available.

Invitations were received to hold meetings in Seattle in 1961, in San Francisco and Los Angeles in 1962, and in Portland, Ore. The Board instructed officials of the Mining Congress to study the proposed meeting sites and report back their findings and recommendations in due course.

Brief remarks were made by President Howard I. Young, Program Chairman Frank Coolbaugh, and Manufacturers Division Chairman Jack How. Julian Conover spoke on behalf of the Resolutions Committee, expressing appreciation to San Francisco for acting as host to the meeting; to the mining people of California who worked so hard to make the Convention visitors feel at home; and to the San Francisco press, radio and television representatives who so ably covered the various activities of the Mining Show.

#### **EVENING ENTERTAINMENT**

THE two evening parties for mining men and their ladies came up to the standards set at previous AMC Conventions! The Miners Jamboree at the historic Palace of Fine Arts on Tuesday evening was a high point in the convention, only to be surpassed by the AMC Dinner Dance on Thursday evening.

At the Jamboree, the upper areas of the famous old 1915 World's Fair building were tinted with smoke from the barbecue grills where a "chuck wagon dinner" of sizzling steak with all the "fixings" was prepared. At



Cris Dobbins, new Chairman of the Western Division of the American Mining Congress

floor level congeniality and good spirit reigned as old friends met and new friends were made. Manny Harmon's orchestra and a varied floor show made a real hit with the miners.

The informality of the AMC Dinner-Dance on Thursday evening made it another festive event that won't soon be forgotten. A delicious dinner, coupled with a sparkling floor show and an atmosphere of good fellowship made this banquet a climactic event.

San Francisco went all out to welcome the miners, and on the open evenings, many smaller parties were in evidence all over town—mining people enjoying the city's excellent entertainments and unsurpassed eating places.

#### SPECIAL EVENTS FOR THE LADIES

N especially enjoyable program A of daytime events was also arranged for the miners' ladies. The Ladies Committee, under the co-chairmanship of Mrs. Paul C. Henshaw and Mrs. Jack H. How, was responsible for delightful activities which kept the ladies "on the go" throughout the week. Monday they crossed the Golden Gate to Sausalito for a reception and tea at the Alta Mira Hotel-which provided a restful view over San Francisco Bay. On Tuesday they trekked east to Pleasanton, in California's wine country, for a luncheon at the beautiful Castlewood Country Club, former home of Phoebe Apperson Hearst. And on Wednesday they remained in San Francisco's cosmopolitan atmosphere to attend a special luncheon at the Fairmont Hotel with a glamorous style show by Saks Fifth Ave. In addition to all this, a large number of the ladies attended program sessions and inspected the exhibits at the Civic Center-and of course, turned out en masse for the

(Continued on page 57)



Highlight of the ladies program was a fashion show with over one thousand in

#### AMERICAN MINING CONGRESS

# A Declaration of Policy

Adopted at San Francisco, California, September 22-25, 1958

The abundant life, which is ours as Americans, is deeply rooted in the development of the various natural resources with which this Nation has been blessed. Wise use of the mineral resources buried in the American soil has brought this land from a thinly settled wilderness to an industrial nation of wealth and power unmatched in history. Farsighted government action in the past has helped develop these mineral resources to make our people prosperous and our Nation secure.

Now we have reached that point in history when men of vision must take a new look at the future. Not only must we maintain our prosperity, but our children and our children's children must be assured of an even higher standard of living than we have enjoyed. Our strength must be fortified against the challenge of aggressive and envious rivals. Our resources are needed more than ever, for now they not only support our country but help to support many other nations.

The mining industry, which has fed the Nation raw materials for its marvelous growth, must not be neglected now. It is the basic source of the strength of America.

The resolutions to follow call for a wise reappraisal of our resources, and a strong national policy for minerals, solid fuels and other natural resources. Without such a policy, the prosperity and strength of America will be jeopardized.

#### **GOVERNMENT EXPENDITURES**

Determined effort and effective action is needed to limit government expenditures to no more than is necessary to meet defense and other essential governmental functions adequately and efficiently, without waste, extravagance or political favoritism. Federal governmental activity should not extend to those matters which the people themselves, through private enterprise or their local or State agencies, are able to carry out.

The Federal Government should refuse, during the period of high defense expenditures, to embark on new programs not of immediate necessity.

Economic disaster lies ahead if government expenditures continue to exceed revenues. To pre-

vent such disaster, the reduction of government expenditures should be accompanied by a reduction of tax rates to a level which will increase the tax yield by stimulating economic activity.

#### TAXATION

Minerals of the earth must be made available for our defense and general welfare. Finding and developing new reserves to replace those exhausted must be encouraged in every possible way. The costs, the risks and the failures are constantly increasing. Profits, after taxes, must be adequate to furnish needed incentives if we are to have the continuing supply of required minerals.

With respect to income taxation, it is essential that depletion, depreciation, and net loss carry-overs be fully and adequately allowed at not less than authorized by present provisions of the Internal Revenue Code.

In the case of State taxation, those States which grant an adequate depletion allowance patterned after the Federal law will encourage the development of the mining industry and thereby increase their own revenues.

We particularly urge upon the Congress of the United States the following:

- Exploration expenditures should be fully deductible and present limitations should be removed.
- The present high tax rates should be reduced to restore adequate incentive for investment risk, economic effort and initiative. Their reduction will benefit the economy and yield increased revenues to the Government.
- The limited allowance now made to stockholders on dividends with respect to taxes paid by the corporation should be further extended. The depletion allowed to a mining corporation should be carried through to the stockholder on an adequate and equitable basis. Intercorporate dividends should not be doubly taxed.
- As the result of the past and continuing cheapening of the dollar, it is vital that our methods of computing taxable income be adjusted to avoid the confiscation of capital, to recognize continually increasing costs of replacing plant and equipment, and to recognize that most capital gains during periods of inflation of the dollar are a reflection of inflation rather than taxable income.
- The income tax laws of the United States should encourage the economic development of under-

developed countries by private capital, rather than through the use of government funds at the expense of our taxpayers. Protection of domestic production against destruction by excessive imports should be provided through import duties and other proper restrictions, rather than through extension of differential treatment in the income tax laws.

#### LABOR RELATIONS

The failure of both the Senate and the House of Representatives to consider effective labor legislation during the last session of the 85th Congress is a matter for grave concern and alarm. This failure, in the face of glaring revelations and widespread public indignation, is highly indicative of the extent of legislative control which the labor professionals have attained.

The necessity for legislation designed to eliminate labor monopoly and to promote democratic, responsible representation of the American wage earner in the field of collective bargaining has long been urged by the mining industry. With proven facts before it, Congress must act immediately to protect our economy and the rights of individual citizens against the corrosive effects of labor despotism and corruption. The time has come when the special privileges and grants of immunity long vouchsafed to the leaders of organized labor by Congress and the Federal judiciary must be withdrawn. Farsighted union leadership must accept the legal responsibilities and limitations which have historically been imposed upon those whose unfettered power has become a matter of grave national concern.

We urgently recommend the elimination by Congress of the devices employed by labor leaders to destroy competition in our free enterprise system, to force the American worker into union bondage against his will, and to jeopardize the welfare of the American public. To this end we urge the enactment by Congress of the following legislative reforms in the field of labor-management relations:

- 1. The elimination of Federal sanction of compulsory unionism in any form.
- The elimination of Federal compulsion with respect to the procedures and subjects of collective bargaining.
- The prohibition of industry-wide bargaining and industry-wide strikes.
- 4. The elimination of the exemption of unions from the antitrust laws.
- 5. The repeal of the Norris-LaGuardia Anti-Injunction Act.
- The prohibition of union practices and combinations which operate to fix prices and restrain competition.

- The extension of the secondary boycott prohibition to coercive activities against neutral employers.
- 8. The strengthening of the prohibition against the use of union funds for political activity.
- The effective protection of union-administered welfare funds.
- The prohibition of strikes unless approved by supervised secret ballot vote of the employees directly affected.
- 11. The promotion of democracy in unions by providing minimum requirements with respect to such matters as the election and tenure of officers, the imposition of fines and penalties, the revocability of dues assignments, the quorums and procedures necessary for official action and the accountability for and use of union funds.

Equally urgent is the recognition by Congress of the oft-made but unheeded charge that judicial interpretations in the field of labor relations are threatening the basic structure of our republic of Federated States. In the face of recent decisions of the Supreme Court of the United States, the time has come for Congress to renounce the extent of exercise of Federal power which the Court has erroneously attributed to it and to restore to the States their traditional right to regulate local matters and to afford judicial relief to their citizens. We urge the enactment by Congress of legislation specifically defining the area of Federal regulation and negating any intention to encroach upon States' rights in areas not intended to be preempted.

To these principles and specific recommendations we dedicate our energies and pledge our support to the end that our free economy shall flourish, the dignity and rights of the individual shall be preserved, the proper relationship between Federal and State authority shall be restored, and responsible, democratic unionism shall take its rightful place in the structure of our society.

#### SOCIAL SECURITY

The amendments to the Social Security laws enacted by the 85th Congress during an election year again demonstrate that political expediency rather than sound economic thinking directs Congressional action in this field.

We recommend an immediate reappraisal of the Social Security program by Congress. It has long been a matter of grave concern that taxes collected solely and specifically for social security purposes are being used to defray other governmental expenses. To learn that, in addition to this profligate practice, the fund for the payment of Social Security benefits is being maintained on an actuarially unsound basis is cause for genuine

alarm. Contrary to the repeated assurances of the social planners, the current year will witness an excess of benefit disbursements over Social Security tax collections. We urge enactment of legislation which will require a full and honest report of the financial conditions of the fund raised to satisfy the benefits created, to the end that beneficiaries may be advised if the benefits created can be paid.

#### NEED FOR NATIONAL MINERALS POLICY

We again endorse the Government policy that a strong, vigorous and efficient domestic mining industry is essential to the security and economic welfare of the United States. Experience has shown that we cannot always depend upon foreign sources of mineral supply in an emergency, and common sense dictates that an adequate domestic supply of minerals is essential for the protection of consumers even in times of peace. The nature of mining, with its high initial capital costs, great risks, and the need for planning production many years in advance, requires a National Minerals Policy for the development of the mineral resources of the United States.

While the Administration has recognized the need for a strong National Minerals Policy for many years, progress has been painfully slow. We urge that all branches of Government consult and advise with recognized representatives of the domestic industry while proposals are in formative stages so that a practical, constructive policy can be evolved and promptly adopted. We have reached a critical stage where temporary expedients and halfway measures serve no useful purpose.

We express our deep appreciation to those Senators, Congressmen and Government officials who have worked for the formulation and adoption of a sound National Minerals Policy.

#### CONTROL OF IMPORTS

We recommend that Congress reestablish and exercise its authority over tariffs. Adequate import taxes and/or tariff protection, properly applied, are necessary to maintain many important segments of the domestic mining industry. Therefore, we strongly urge prompt enactment of legislation, as follows:

(1) That as to certain of those metals and minerals in which the United States produces a substantial portion of our domestic requirements, adequate import taxes be established, to be imposed and collected only if and when the average

monthly price falls below a reasonable prescribed point legislated for each metal and mineral respectively; thus providing a market free of any duty for foreign imports so long as the average monthly price is at or above the prescribed point.

- (2) That as to those metals and minerals which are produced domestically sufficient only to provide a small percentage of our requirements, adequate programs in line with the circumstances in each case should be instituted and maintained to encourage continuance of such industries.
- (3) When the enactment or application of adequate import taxes and tariffs is not feasible, or otherwise fails to do what is necessary to protect the domestic mining industry, we recommend that import quotas be provided in cases where such device is practical.

We commend Congress for amending the Anti-Dumping Act of 1921, to provide for greater certainty, speed and efficiency in administration and enforcement, particularly as applied to metals and minerals.

Notwithstanding the failure to return to Congress its authority over tariffs and trade or to permit Tariff Commission recommendations to be final and binding, we commend Congress for the following improvements in the 1958 extension of the Trade Agreements Act:

- (a) The reduction from nine months to six months as the time permitted for the Tariff Commission to report to the President in escape clause cases.
- (b) The expanded provision with broader power for the Tariff Commission to obtain information by subpoena.
- (c) The providing of eligibility for groups of employees to file applications for escape clause investigations.
- (d) The authority of the Tariff Commission to initiate escape clause investigations whenever it finds during peril point determinations that import restrictions are required to avoid serious injury to the domestic industry.
- (e) The provisions permitting the Tariff Commission to recommend increased duties to a maximum of 50 per cent over the rates existing in 1934; and in cases where the 1934 duty was specific, the conversion of such duties to the ad valorem equivalent.
- (f) The provision permitting a recommendation for a 50 per cent ad valorem duty on an item bound on the free list in a trade agreement.
- (g) The strengthening of the provisions of the National Security Clause, particularly those requiring consideration of the impact of foreign competition on the economic welfare of domestic industries.
- (h) The provision to permit the Congress by adoption of a concurrent resolution by a two-thirds vote of each House to approve a Tariff Commission recommendation which has been disapproved by the President. Though ineffective in its present form, this provision is a step in the right direction.

We urge that provisions be adopted by the Congress to authorize escape clause proceedings for those metals and minerals now ineligible for such proceedings due to the technicality of the lack of reduction of duties since 1934.

We note the recent modification of United States policy with respect to its past policy of opposition to any arrangement for intergovernmental control of production of metals and minerals. Such change, gradual though it may now be, stems from efforts to avoid implementation of Tariff Commission recommendations in escape clause cases, and from the impact of overproduction by mines outside the United States resulting in a serious decline in world prices.

We strongly recommend that adequate import controls by the United States be invoked first to correct problems of the domestic industries which have been injured. Only as a secondary consideration, and supplemental to such primary action, should discussions among the producing nations of the world be instituted in an attempt to prevail upon foreign producers to bring production into better balance with consumption.

#### STOCKPILING

The national policy of military stockpiling of strategic and critical materials and the provision of adequate funds for orderly purchase in line with the Nation's defense needs is most desirable. As long as the security of the free world is threatened, the Nation's military stockpile must be filled. Minerals for the military stockpile should be processed to a useable form when capacity is available instead of delaying such processing until a time of shortages that may cause serious and unnecessary dislocations. It should be clearly understood that, while the stockpiles will be available in times of national emergency, military stockpile goals under the law are to be set on the basis that a healthy domestic mining industry is to be maintained on an active producing basis to supplement stockpile draw-downs in time of defense needs.

In addition to the Government's military stockpile, Congress has established a supplemental stockpile, under the auspices of the Department of Agriculture, to be acquired through the conversion or exchange of perishable surplus agricultural products into nondeteriorating mineral products.

No withdrawals from the military and supplemental stockpiles should be authorized except in a declared emergency when national security clearly requires release of a particular material.

#### **SOLID FUELS**

The mining industry is abundantly aware of the bitter cup of world tension at the lips of all nations. The need for the Federal Government to formulate and announce a National Fuels Policy—a policy that will recognize the problems of the coal industry—has never been more apparent. The February 26, 1955, report of the President's Advisory Committee on Energy Supplies and Resources Policy pointed this out, not only for coal but for all sources of energy.

An ever increasing number of those in the Federal and State Governments recognize that coal—and only coal—is a natural fuel resource which is plentiful beyond all requirements of peace or war. The need for an adequate expandable coal productive capacity, installed and operated under reasonable economic climate, as well as a transportation industry currently and at all times fully equipped to handle such a production, remains a challenge to those responsible for the safety of the Nation.

There is no better time to point out again that the availability factor reaches the danger point for oil and gas quickly in national emergencies. Natural gas is committed beyond its ability to meet emergency needs of war or unusual weather requirements.

We recommend and strongly endorse the following policy, to assure fair consideration of our solid fuels industry, and to insure national security:

- (1) Adoption of sound principles relating to natural gas pipeline companies in order to assure maximum protection for the consuming public without discrimination against competing fuel industries. This includes discrimination arising from unregulated sales of gas by natural gas pipeline companies. Sound principles of conservation should therefore govern the sale and distribution of natural gas.
- (2) Reduction in volume of imports of crude and residual oils to the respective proportions that these imports of oils bore to the production of domestic crude oil in 1954.
- (3) Activation of fields of research and development for additional uses of coal. The setting up of a Research Commission would be a step forward to achieve this objective.
- (4) An increase in the depletion allowance for solid fuels. Capital needs of a depleting industry require this increase to replace productive capacity.

#### **PUBLIC LANDS**

We consider that the maintaining of full availability of public lands for the finding and development of our national mineral resources is essential to our maximum economic and military strength. Our national well-being and the future safety and security of our people is in large degree dependent on the ability of the mining industry to develop the mineral resources of the United States. It is in the national interest to encourage this continued development.

We oppose the closing of any area to mining location either through creation of new withdrawals, or maintenance of existing withdrawals, or otherwise, except in cases where it is clearly established that the objective for such closing is more important to the national welfare than the full discovery and development of the Nation's mineral resources. We further oppose the extension or continuation of any withdrawal to any area in excess of that required to serve the particular purpose of the withdrawal.

We oppose enactment of any measure which would preclude utilization of the mineral and other natural resources of vast areas of public domain, as being definitely contrary to the public interest not only of the States directly affected but of the Nation.

We are opposed to any legislation which would directly or indirectly constitute a delegation of the power of and responsibility for legislation as to specific public land problems to any board or commission which would permit any recommendations or plans of any such board or commission to become law without affirmative and express statutory enactment by Congress.

We reiterate our confidence in the system established by the General Mining Laws for the location and patenting of mining claims as the means of encouraging and providing for development of the mineral resources of the public domain through private initiative and enterprise; however, we favor an amendment to the General Mining Laws which will afford reasonable prediscovery protection to one who is in good faith engaged in exploratory work.

We commend the Department of the Interior and its Bureau of Land Management for its present application of the General Mining Laws in a manner consonant with the spirit and purpose of those laws and with recognition of long established principles as to what constitutes a sufficient discovery upon a mining claim. We believe, however, that great restraint should be exercised in respect to any holding that a mineral deposit is

not a "valuable" mineral deposit or that it has no "economic value" where the claimant has expended and is willing to expend substantial sums in development of the deposit or in the development of the means or processes to put the deposit to use. That value lies in potential as well as in present use, has been clearly recognized in the instance of our oil shale deposits.

We commend the Department of Agriculture and its Forest Service and the Department of the Interior and its Bureau of Land Management for having invited and given consideration to suggestions from the mining industry as to proposed regulations, the application and administration of which may affect the mining industry or some segment thereof, and we urge upon such governmental agencies that their regulations be administered in accordance with the spirit thereof in order that the development of our natural resources may be prosecuted without undue burden.

#### MINE SAFETY

We firmly believe that it is a major and primary responsibility of the mining industry to continue to provide all employees with working conditions and places of employment that are as healthful and safe as it is practical to provide. Mine operators should continue to give high priority to safety education and training of supervisors and employees and to a safe practices program.

We believe that any necessary safety regulation should come from within the governmental structure of the States.

We heartily commend the United States Bureau of Mines for its excellent service to the mining industry in developing and demonstrating improved techniques in mine accident prevention and promoting mine safety education, including first-aid and rescue training. We urge that the Bureau of Mines be given adequate financial support.

The steady yearly decline of accidental deaths and injuries within the mining industry demonstrates the effectiveness of the industry's aggressive safety program.

#### WATER AND AIR POLLUTION

Problems having to do with water and air pollution are distinctly related to individual situations and are therefore local in character. The solution of such problems is the responsibility and the right of local and State jurisdictions.

It must be particularly recognized that the nature and extent of air pollution is determined

wholly by local conditions and activities, and consequently that the local jurisdictions should retain full responsibility for evaluation and control of such pollution.

In its consideration of grants-in-aid to the States for pollution control facilities, Congress should insure that State and local agencies administering the allocation of such grants retain full authority and responsibility to determine the financial and health needs of the communities, and to approve and supervise the distribution and use of such grants.

#### GOLD, SILVER AND MONETARY POLICY

Continued and increased production of gold is of vital importance, for no nation has been able to long maintain the value of its currency without adequate gold reserves. Canada, our next-door neighbor, has long recognized the importance of gold and has encouraged greater production by bonus payments for newly mined gold and by tax advantages for new mining ventures. Silver, likewise, has a long historical and practical function in the currencies of this Nation and of the world, and is a store of value for millions of the world's population.

The dollar, as well as most of the major currencies of the world, continues to depreciate year by year in spite of efforts to restrain its decline through monetary management. Unfortunately, without the discipline of the gold standard, the defenses against the forces that make inflation almost inevitable are weak and ineffective.

We recommend that the Treasury continue to purchase all newly mined domestic gold and silver tendered by producers, and that all present stocks and future acquisitions of gold and silver be utilized by the Treasury for monetary purposes only, in order to preserve and improve the backing of our currency and to promote prudent fiscal management of the Government.

We recommend that the restrictions on the purchase, ownership and sale of gold and silver by United States citizens be abolished.

We recommend that the seigniorage imposed by the Treasury on its purchase of newly mined domestic silver be removed.

We recommend that Congress fix the ratio at which the dollar and gold are to be made fully convertible and proceed with the restoration of the gold standard. We further recommend that the Administration recognize the historical and traditional attachment to gold and silver money throughout the world and, as a part of its foreign

policy, aid and encourage other governments in restoring gold and silver coinage as a circulating medium, as a standard of value, and as a means of conserving intrinsic wealth.

#### URANIUM

We commend the Atomic Energy Commission for the announcement of its raw materials program for the 1962-1966 period. This program should be promptly clarified, officially adopted by the Commission, and published in the Federal Register. The price of \$8 per pound for U<sub>3</sub>O<sub>8</sub> in this period should be escalated in line with production costs as compared to those existing on the date of the announcement. While commendable progress has been made toward providing current markets for existing mines and ore reserves, some remain without market. This should be corrected promptly by the Atomic Energy Commission. Since the Commission's announcement that it would no longer provide assured markets for new ore reserves, incentive for future exploration has ceased to exist. With only ten years' known reserves in the United States, this situation should be kept in mind in further formulation of AEC policy.

While we realize that most foreign raw material contracts are of long standing, the higher price paid to foreigners has given them an advantage in exploration and development over the domestic miner. No extensions of present foreign contracts should be made unless available domestic sources fail to meet procurement demands.

We commend the Atomic Energy Commission for its efforts to maintain the leadership of the United States in the development of atomic energy. The Commission's encouragement of private industry in the field of scientific research and development, its own expanded efforts in this field, and its agreements with the Euratom nations and other friendly countries in promoting the use of atomic power are most laudable. We believe that recent AEC uranium price schedules have affected adversely certain markets for private production. The encouragement of the sale of raw materials by United States producers in the free markets should be kept in mind in connection with all new programs at home and with friendly nations.

We commend the Atomic Energy Commission for authorizing the sale of uranium concentrate to consumers other than itself. We urge that the Commission remove all restrictions on such sales other than security license requirements, since the necessity of obtaining Government approval of free sales in commerce, with the inherent difficulties in obtaining prompt action by Government agencies, will unnecessarily impede and obstruct such transactions.

#### GEOLOGICAL SURVEY—BUREAU OF MINES— BUREAU OF LAND MANAGEMENT

We extend our commendation to the leadership of the Department of the Interior and its agencies for their sincere interest in the domestic mining industry and for their efforts to adhere to traditional practices and procedures under laws affecting the mining industry.

We especially commend the U. S. Geological Survey, the Bureau of Land Management, and the Bureau of Mines for efficiency and achievement in their special fields. These agencies and their capable personnel deserve the greatest consideration of the executive and legislative branches of the Federal Government consistent with a sound budget.

Topographic and geologic mapping should be accelerated as rapidly as funds and specialized manpower permit. Studies of water, increasingly vital to all industry including mining, should be expanded.

Adequate funds should be provided to finance and house the essential agencies concerned with mining.

We are encouraged by recent developments in transferring more and more Federal responsibilities affecting mineral resources to the Department of the Interior, and we oppose any move to scatter such responsibilities among other Departments and agencies.

#### **GOVERNMENT REORGANIZATION**

We deplore the steady growth in costs of government at all levels.

We have consistently supported programs for increasing the efficiency of Federal government agencies by elimination of overlapping functions, consolidations of agencies, transfer of activities to State and local governments, and by withdrawal of competition with private industry and individual citizens in business enterprise.

We urge early and favorable action on Hoover Commission proposals to reduce government costs, as well as such other measures as may be advanced to enforce economy and efficiency throughout the Federal services.

#### MINE FINANCING

Commercial mining operations begin with the extraction of ores and minerals from the earth. The maintenance of our mining industry requires constant addition to established ore reserves by exploration, discovery and development of new deposits. Discovery and exploration and the development required to bring new discoveries into commercial production are possible only by the risk of venture capital.

There is no question that the raising of such capital should be done without misrepresentation of the prospect of success or misapplication of funds raised. Otherwise the mining industry as a whole is handicapped in obtaining required new capital. However, it is usually not possible, until after expenditure of very substantial sums, to say that a mining enterprise is established beyond the venture stage. The standards which may be applicable to investments in manufacturing or merchandising establishments are not entirely suitable for application to mining ventures which necessarily are of different character. This essential difference has not received sufficient recognition.

We urge that all branches of Government, and particularly the Securities and Exchange Commission, recognize the practical objectives and circumstances incident to mine financing so that, in endeavoring to prevent abuses, whether real or alleged, proper financing of mine enterprises will not be unduly discouraged, burdened or prevented. We urge that all branches of Government consult and advise with representatives of the mining industry while proposed legislation and regulations are in their formative stages, to the end that only constructive, sound and practical measures shall be adopted.

We are unalterably opposed to the principle of requiring corporations to delay normal business transactions because of a blanket Government-imposed prior-notice law. If any premerger notification law should seem advisable, there should be a clear exception for undeveloped or partially developed mineral properties.

We commend Congress for establishing a domestic minerals exploration loan program, and the Secretary of the Interior for promptly organizing the Office of Minerals Exploration to administer such program. We believe, however, that the success of the program, which is essentially a continuation of the D.M.E.A. program, is jeopardized by the inadequate amount of money appropriated, as well as by unnecessary restrictions in the law relating to (1) the eligibility requirements with

respect to providing evidence that funds cannot otherwise be obtained on reasonable terms, (2) the excessive interest charged on such loans, and (3) the fact that no one contract can exceed the sum of \$250,000. We urge that unwise and impractical restrictions be removed by the next Congress and that adequate funds be provided to administer this program on a permanent basis.

#### RADIO FREQUENCY ALLOCATIONS

We commend the Federal Communications Commission for its action in rejecting a proposal to abolish the Special Industrial Radio Service and to relegate mining and other important industries to inferior and crowded conditions in a new Business Radio Service. We also commend the Commission's action in creating a new Special Industrial Radio Service from which certain groups of radio users have been eliminated, and under which additional frequencies have been made available to mining and other essential industries,

thus alleviating much of the prevailing congestion and interference.

The mining industry is heartened by the FCC order providing for the creation of a voluntary frequency advisory service to bring about maximum utilization of available frequencies within the Special Industrial Radio Service with a minimum of interference among users. The industry is cooperating wholeheartedly in the development of an organization to effectively meet the objectives of the FCC order.

The American Mining Congress, through its Radio Committee, stands ready to maintain liaison with the Federal Communications Commission, with other organizations in the mining industry interested in radio communications, with other users in the Special Industrial Radio Service, and with the newly-formed frequency advisory service, with the objective of protecting the interests of the entire mining industry and obtaining adoption of constructive communications policies which are so important to the safe and efficient operation of mining properties.

(Continued from page 49)

Jamboree and the Dinner Dance on Tuesday and Thursday evenings.

#### FIELD TRIPS

INDUSTRIAL areas down the pen-insula from San Francisco also proved their drawing power by enticing many of the convention goers, still going strong after a strenuous week, to take the well-organized tours which had been planned by the Trips Committee under the chairmanship of J. A. Mecia, manager of the Mining Division of Utah Construction Co. One group went down to Kaiser's Permanente Cement Plant, one of the world's largest, in the Santa Clara hills. After lunching at the Los Altos Golf and Country Club they continued to the 60-acre Westinghouse plant to see how turbines, motors and electronic controls are manufactured.

Another group visited the Stanford Research Institute at Menlo Park, where they paid particular attention to the work of the metallurgical group at the Earth Sciences Division. After a drive through the Stanford University campus, they joined the first group for luncheon and then continued to the plant and laboratory of Hewlett-Packard Co. to see electronic and scientific equipment being made. The final stop before returning to San Francisco was at the publishing facilities of Sunset Magazine.

#### ANOTHER SALMON DERBY

SOME 135 sportsmen-miners, ladies included, got an early start Friday morning to join the Salmon Derby which sailed from the Sausalito fishing wharves through the Golden



Thirty-nine pound prizewinner

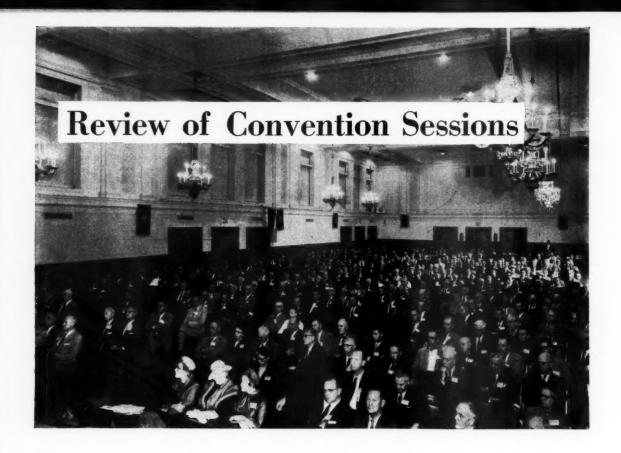
Gate and into the Pacific where the "big ones" are encountered. The fishing was exceptionally good, and the miners got a real thrill out of the day's outing. Top prize went to J. Hall Carpenter who caught a 39-pound salmon, and Stanley E. Jerome took second honors with a 29-pounder. The winner's prize was a gold miner's "poke" containing \$100 in gold nuggets.

#### COMMITTEES DESERVE THANKS

AN Francisco and members of its mining fraternity did themselves proud in making this one of the greatest mining gatherings ever held. The industry owes a hearty vote of thanks to "Jack" Bradley, president of the Bunker Hill Company, who served as general chairman of the Convention; to E. A. Hassan, Jr., manager, exploration department, Kaiser Aluminum and Chemical Corp., who was vice chairman, and to the many other San Franciscans whose cooperation helped to assure the complete success of the 1958 Mining Show. Chairmen of committees in addition to those mentioned above included W. Wallace Mein, president of Calaveras Cement Co., who was chairman of the Welcoming Committee, John L. Merrill, president of the Merrill Co., and L. M. Holland, secretary of the Mining Committees of the San Francisco Chamber of Commerce, who served as chairman and vice chairman of the Publicity Committee. The smooth running of the entire meeting reflected the efforts of hundreds who lent their support and cooperation.

Miners are now looking forward to next year's Convention which will be held in Denver, September 14 to 16—for which preparations are already under way, under the leadership of the incoming chairman of the Western Division, Cris Dobbins. What the next twelve months will bring in the way of progress or problems for the mining industry is uncertain, but you can be certain of one thing, that you will want to be in Denver next Sep-

tember.



Large crowds of intent listeners attended the convention sessions to hear highly qualified men from industry and government speak on the most significant phases of mining. A brief outline of each session is presented here, to be followed by publication of the full text of most of the talks in future issues of Mining Congress Journal.

#### NATIONAL MINERAL POLICIES

THE first session on National Mineral Policies was held Tuseday morning with Rep. Ed Edmondson of Oklahoma as chairman. Thomas C. Mann, Assistant Secre-

Thomas C. Mann, Assistant Secretary of State for Economic Affairs, declared that oversupply, low prices and unemployment plaguing lead and zinc producing countries are a "world problem" and that the United States will continue to support efforts already under way to try to work out a multilateral solution.

He noted that meetings were held in London early in September under United Nations auspices at which means for international stabilization of lead and zinc markets were discussed, and that the U. S. intended to notify participating countries that it desires to continue the conversations.

In referring to the new U. S. import quotas on lead and zinc, Mann said there were a number of reasons why quotas were more acceptable to the President than tariffs. "First," he said, "is the circumstance that multilateral discussions are already under way in search of a solution to the long-term problem of chronic imbalance between production and demand. Quotas, whether they be import or export, are consistent with the suggestions for voluntary export quotas made in the course of these

(London) discussions and are a sign of our intention to seek multilateral solutions.

"Second, quotas in this situation will better make available any alternative to stabilize prices, which will benefit not only domestic producers but foreign producers as well.

"Third, quotas avoid the necessity of the foreign producer having to absorb the cost of increased tariffs and this will allow the foreign producers a larger part of the proceeds of their sales in the U. S. market," Mann asserted.

Congressional views on National Mineral Policies were presented by Senator Gordon Allott of Colorado



Thomas C. Mann discussed quotas and lead-zinc problems

and Reps. Clair Engle of California and William A. Dawson of Utah.

Allott said that with respect to the problems of domestic minerals producers, "I can see no permanent cure solely in the juggling of tariffs and quotas." He declared that "first and foremost it still stands out that Congress, with your aid, must pass legislation which states at what level our mining industry shall be maintained as a matter of national well-being. By way of suggestion, it might be based upon a percentage of the national consumption in the case of lead and zinc. This would probably be It could conceivably be workable. based upon historical production in the case of tungsten, with provisions in each case for adjustment from year to year.

There are perhaps other methods, Allott continued, "but the important thing is that if we tell the world that it is our intention to maintain our minerals industry at a specific level by whatever means are appropriate, overproduction abroad, especially in times of surplus and falling prices, would be the result of their own folly."

Engle suggested that the mining industry could unite on a federally-financed support program if aid was restricted to those who need it to stay in business, and that support legislation should require that aid go only to production important to the national economy or defense.

"I concluded a long time ago," Engle said, "that the only way to be of practical assistance to the domestic mining industry was through a system of support prices of one kind or another." He declared that "the domestic mining industry cannot survive very much longer as a substantial and important part of the American economy without some assistance—and very soon."

Dawson said that the House's failure to enact a domestic minerals stabilization bill "made it clear that the escape clause, and not special legislation, should be the remedy for the lead and zinc industry" and for other industries driven to the wall by eco-

nomic advantage enjoyed by foreign competitors.

In theory the Trade Agreements Act, with its escape clause and peril point provisions, is sound, he declared, but a rising tide of resentment stems from administrative "reluctance to invoke the escape clause after an industry has shown beyond reasonable doubt that it is being injured seriously by a too-liberal trade concession." Dawson added that "Each passing year only confirms my conviction that what is needed is for Congress to take a firmer grip on its constitutional power to set tariff rates."

A SECOND SESSION on National Mineral Policies, at which Canadian and domestic industry views were presented, was held Tuesday afternoon, with Rep. Walter Rogers of Texas presiding.

V. C. Wansbrough, managing director of the Canadian Metal Mining Association, declared that Canadians are not in favor of increased tariffs and import restrictions, nor of any form of subsidized production.

"We believe" Wansbrough said, "that the answer to our current problems, which are bound to inflict, and indeed have inflicted in our country as in yours, a good deal of difficult local readjustment to circumstances, is to allow the market forces of supply and demand to adjust themselves, as they inevitably will, into reasonable equilibrium, and meanwhile, by all means in our power, to stimulate demand and consumption."

C. E. Schwab, chairman of the Emergency Lead-Zinc Committee, noted that the newly imposed quotas on imports of lead and zinc mark the first time in history that a quota was placed on a nonagricultural commodity as a result of an escape-clause petition. His Committee had sought an adequate tariff to correct the problem of excessive imports, Schwab said, but "as far as our industry is concerned, we will continue to cooperate with all those concerned in this matter."

He added that "we see in the plan sufficient flexibility where it can cope with any situation which might arise. Particularly, we think we should emphaize that United States consumers are going to have all of the metal they want."

Miles P. Romney, manager of the Utah Mining Association, declared that "the principal objective of a basic minerals policy should be to provide an economic climate embodying the incentive to stimulate exploration for, and development of, our Nation's mineral resources." But, he said, establishment of "conditions favorable to the development of a healthy, growing domestic mining industry are not attainable as long as present practices in the handling of minerals and metals problems in international relations continue as a barrier."

Romney concluded that the basic objective "can only be obtained through revision of our international relations in the field of commerce and trade aimed at establishing self-preservation of our resources, our defense and our economy."

Lawrence Litchfield, Jr., vice president of the Aluminum Company of America, said domestic producers of primary aluminum face an increasingly complicated problem in meeting foreign competition in view of Soviet dumping of aluminum on the Free World market. The remedy, he declared, is an "import quota and surplus disposal program" which would limit aluminum imports in times of surplus and channel surpluses to underdeveloped areas which need them

Litchfield added that it is the intention of the aluminum industry that Government "control" in regard to this proposal take the form of negotiation rather than any rigid law or decree, and that it be included in any National Minerals Policy.

most.

S. H. Williston, vice president, Cordero Mining Company, said that the situation facing the strategic metals is dark, adding that "Importations from abroad, where wage rates range from 50 cents a day to \$6 a day with negligible tariff protection, are taking the market away from domestic producers whose wage rate, including fringe benefits, is over, and in some cases well over, \$21."

He reviewed the current status of beryl, chromite, columbium-tantalum, tungsten, antimony, manganese, and cobalt, and asserted that as long as present Government policy with respect to these metals continues, "the strategic metal industry is dead."

Clyde L. Flynn, Jr., Elizabethtown, Ill., declared that the domestic fluor-spar industry will, "in the absence of prompt and effective measures to limit imports, cease to exist December 31, 1958," when Government purchase programs expire. He urged

adoption of a national policy to limit imports so that domestic production of acid-grade fluorspar can be maintained at no less than 225,000 tons annually, and of metallurgical-grade fluorspar at 45 percent of domestic requirements.

"In the opinion of the industry," Flynn said, "it will be only by the imposition of quotas that such a policy can be put into effect and our industry be saved from destruction."

Charles J. Potter, president of the Rochester & Pittsburgh Coal Co., outlined the problems of the coal mining industry, including external problems arising "directly from and incident to the Trade Agreements Act and its administration in respect to imported oil, gas, electric energy, restrictions by foreign nations on the import of U. S. coal, and the financing in whole or in part with U. S. funds of competitive sources of energy in foreign markets normally served by U. S. coal."

The Trade Agreements Act, Potter said, is inimical to the energy industries of the United States, and he declared that "the United States coal industry asks its Government for equity and particularly justice which it is not now getting."

Horace M. Albright, consultant-director, U. S. Borax & Chemical Corp., said the domestic potash industry "is in trouble due to over-production, reduction of prices to a 20-year low, rising costs, strikes, and increased importations from several European countries, including Russia."

He suggested that both the United States and Canada where rich new deposits are being developed, could "clamp down a tight restriction against more mineral leases in support of a strong conservation policy," and that Congress could enact stronger antidumping legislation "which could have the effect of limiting of imports, especially from East Germany and Russia."

#### LABOR RELATIONS

ENNETH C. KELLAR, general counsel of Homestake Mining Co., of Lead, S. Dak., presided at a labor relations session which featured talks by Senator William Knowland of California; Dension Kitchel, attorney of Phoenix, Ariz., and Rufus G. Poole, labor attorney for the potash industry.

Knowland said, "The two great problems we face at this time, both nationally and in our State, are first the danger of Government's expanding beyond the reach of our citizens, and secondly, the growing power of arbitrary labor bosses who now dominate much of our industry and most of our workers."

Pointing out the need for labor organizations, Knowland said that ef-



Senator William Knowland described the "growing power of arbitrary labor bosses" as one of the great problems facing our country today

fective control of union activities should be returned to the individual labor union member. To this end, he supported a nine-point program which includes a guarantee of the election of union officials by secret ballot and assurance that the ballot cast is the one that is counted; a provision for the recall of union officials who misuse their positions of trust and responsibility; prevention of conspiracies between management and union officials which work against the welfare of union members; protection of union members' welfare and pension programs and a requirement that where unions are permitted, under law, to represent all employes in an industry or plant, all employes must be admitted into the union if they should desire union membership.

Knowland said he also supported measures which would provide that union members shall have a voice in the conditions, terms and duration of strikes; would prevent arbitrary control over local unions by trustees appointed by national or international unions; would provide for the regulation by union members of the actions of their unions on questions of excessive union fees or assessments; and would provide for voluntary and not compulsory unionism, so that if a man decides not to belong to a union which is not democratically run, he will not be penalized by the loss of his job. The California Senator received a prolonged ovation upon completion of his address.

Denison Kitchel told of the experience of Mr. Keller and himself as employer delegates to the International Labor Organization meeting on mining held in Switzerland last year. Comparing the conference to an "Alice in Wonderland" theme, Kitchel said that continued participation in the ILO by the United States is not in the best national interest. He said the ILO is the vehicle of the international socialists and the tool of the left-wing international trade unionists. He said the United States pays twenty-five percent of the cost of maintaining and operating the International Labor Organization, and that he and Kellar both questioned whether such a contribution to national suicide is in the best interests of the country.

After tracing the growth of the labor union movement and mentioning some of the corruption revealed by the McClellan Committee, Rufus G. Poole said, "Time is running out! Businessmen and employers have delayed organized political action too long! If our free and competitive institutions are to be preserved, they must act now!" He emphasized that if employers want to be heard in the Congress or the State legislatures it must be by organization, industry by industry, locality by locality, State by State and nationally. He said that both in organization and actvities, employers should parallel organized labor to the extent permitted by law. Only by matching the political strength of organized labor will the case of the businessman and employer be given equal consideration, he said.

#### TAXATION

ENATOR THOMAS E. MARTIN SENATOR THOMAS E. MARTIN of Iowa, presided over the Tax Panel on Wednesday morning. He said that even in the face of our obvious defense needs, existing high tax rates should be reduced, because we have passed the point of diminishing returns. "If the over-all rates upon the income of individuals and corporations did not exceed 50 percent, if the capital gains rate were reduced, and if the depreciation allowances were revised to permit full and early recovery of capital costs," Senator Martin stated, "I believe the economy would be stimulated to such an extent that our revenues would actually increase, rather than decrease.'

Rep. Hale Boggs of Louisiana, a member of the House Ways and Means Committee, discussed the changes made by the Technical Amendments Act of 1958 in the Internal Revenue Code definition of the "property" which forms the depletion unit. He cautioned the industry to continue its efforts to obtain a public understanding of the importance of the percentage depletion deduction to the public welfare, predicting that further attacks on depletion rates would be made next year. Rep. Boggs also referred to the 1958 request of the



Good fellowship, not the subject discussed, prompted these smiles at the Tax Forum

Treasury Department for legislation cutting back the allowable ordinary treatment processes in the clay and cement industries. He expressed the view that it "would be difficult" to confine legislative consideration of the ordinary treatment processes to clay and cement, in view of the large number of pending refund claims involving the allowable processes for a great number of other minerals.

Delbert W. Williams, Chief of the Natural Resources Section of the Internal Revenue Service, discussed the function of the engineer agents in the handling of the tax returns of mining taxpayers. Ellsworth C. Alvord, AMC Tax Counsel, presented an analysis of the economic trend and pointed out the many variable factors which will affect the speed of our economic recovery.

At an all-day "Tax Forum" on Friday, Lincoln Arnold, chairman of the AMC Tax Committee, led the discussion of current tax problems. Bruce Matthews, of Arthur Anderson & Co., Denver, summarized the provisions of the Technical Amendments Act of 1958 which are of special interest to the mining industry, and G. William Welsch, of Lybrand, Ross Bros. & Montgomery, Dallas, presented a talk on methods of allocation. Considerable attention was devoted to the new definition of the "property" as contained in the Technical Amendments Act of 1958, with panel discussion by several members of the Tax Committee. Those present participated actively in the discussion of various tax problems, with particular interest shown in the problems of "ordinary treatment process."

#### PUBLIC LANDS

THE annual Public Lands session Wednesday afternoon was conducted under the chairmanship of Rep. Wayne Aspinall of Colorado. The program began with a panel discussion on the Impact of Recent Court Decisions on the "Rule of Discovery."

On the panel were Raymond B. Holbrook, counsel, U. S. Smelting Refining & Mining Co., Salt Lake City; Robert S. Palmer, executive vice president, Colorado Mining Association, Denver; R. Lauren Moran, attorney, Riverton, Wyo.; Oscar W. Worthwine, attorney, Boise, Idaho; and Elmer F. Bennett, Under Secretary of the Interior and former Interior Department Solicitor.

The panel brought out that during the past year the Supreme Courts of several Western States, in handing down decisions involving the question of sufficiency of discoveries on mining claims, have reached conclusions which in some cases are irreconcilable. These cases generally involved suits between rival claimants, and also involved the use of geophysical prospecting devices such as geiger counters. One panelist pointed out that mining claimants should not be misled by the "laxity of some courts in suits between claimants into believing that the Interior Department in patent or other proceedings no longer requires adequate proof of discovery.

Under Secretary Bennett, after reviewing the objectives of the Atomic Energy Act and recent judicial developments, suggested that "it may be well for your group, and others similarly interested, to decide whether you will risk further judicial construction of the term 'discovery' or seek a statutory definition."

Edward Woozley, Director of the Bureau of Land Management, gave a resume of his agency's mineral activities with respect to U. S. public lands. He pointed out that in the past year 120 minerals patents were issued for more than 22,000 acres of mineral lands.

W. Howard Gray, Ely, Nev., attorney and chairman of the Public Lands Committee of the American Mining Congress, discussed changes in assessment work requirements made during the last session of Congress. He said that Congress had taken a "very forward step" in enacting legislation

permitting the crediting of geophysical, geochemical and geological surveys towards fulfillment of the annual labor requirements on unpatented mining claims. However, he said that the law as finally adopted contains language which requires clarification if it is to serve the purpose for which intended. He also pointed out that it is going to require State legislation to amplify its provisions. Rep. Aspinall commented that the bill was passed in the last day of the past Congressional session and that the House Interior Committee was aware that it was not an entirely satisfactory measure.

Phil R. Holdsworth, Territorial Commissioner of Mines, Juneau, Alaska, discussed the management of Federal lands, particularly in Alaska. He noted that Alaska's 270 million acres of vacant public land comprise over 60 percent of the vacant public land in the 49 states, and added that "We are somewhat concerned over the apparent interest on the part of nonresidents in withdrawing or reserving large blocks of this land area for single-purpose use without prior classification."

#### GOLD, SILVER AND MONETARY POLICIES

CALLING for protection and expansion of domestic stocks of silver and repeal of the silver transaction tax, Senator Alan Bible of Nevada was a featured speaker at a session on Gold, Silver and Monetary Policies held Wednesday morning. D. L. Feathers, vice president and secretary of The Bunker Hill Co. also made some observations on silver while Reid Taylor of Mitchell, Hutchins & Co. of Chicago presented a clear picture of the current gold situation and the need for a free market for gold.

The session was presided over by co-chairman Donald H. McLaughlin, president of Homestake Mining Co. and chairman of the AMC Gold Producers Committee, and Joseph T. Hall, president of Callahan Mining Corp.

Bible said that the immediate cause of declining silver production is to be found in the price received for silver in relation to the cost of producing silver. He said mining costs, moving with the general price level, have made unprofitable the search for and development of ore bodies and have forced the closing of many existing mines.

Speaking of silver certificates, he said it is worthy of note that these certificates are the only paper money in the world fully backed by the metal which it purports to represent. He said that it is the only money anywhere that has survived two world cataclysms and that has never been in default.

Bible offered two suggestions to al-

leviate the plight of the domestic silver miner. He called for the Treasury Department to expand its present purchases of silver under the Silver Purchase Acts of 1934, 1939 and 1946, and for establishment of a Governmental policy of a higher price for newly mined domestic silver, such price to be within two percent of the statutory value of monetary silver (\$1.29 per ounce). As a corollary to these suggestions he said that the Treasury should be barred from selling silver to industries and the arts for less than the \$1.29 price.

Adoption of these suggestions, he said, would "be of immeasurable help in permitting silver to secure its rightful place, its rightful recognition." Feathers said "History is replete with examples where wild inflation resulted because offsetting productive capacity was not present. To avoid a breakdown, therefore, we must maintain realistic price levels for metals, and

of money, and there is always a flight from paper.

Discussing the gold problem, Taylor said, "Gold has never lost a battle with inconvertible paper money. It only seems to go up in price because inconvertible paper money never fails to go down. It is understandable that a dictatorial and profligate government should fear the verdict of a free gold market. Such a government fears a free gold market because it is the logical first step to restore redeemable money." He pointed out that wherever you find money redeemable in gold you find a sane and responsible government. A sane and responsible government is again a prerequsite to an economy that is sound-not one built on the shifting sands of inflation.

Taylor went on to say that possibly we and those who live after us will look back with gratitude to those who are planning to open a completely

say that possibly ve after us will ude to those who en a completely the will define the will be are the property of the proper

Reid Taylor presented a searching analysis of the gold situation

where money is concerned, we must begin with gold and silver."

Feathers pointed out that silver is principally a New World metal and is a natural money metal. He said, "why this rather simple fact has not been recognized and exploited by this country is very difficult to understand, for an enlightened policy whereby the production of silver would be substantially encouraged, must of necessity go a long way toward increasing the wealth and thus the ability to buy of our neighbors." He said that instead of taking advantage of this natural opportunity, our policy has been characterized largely by indecisive-ness, with the result that this immense potential in the way of increased buying power and good will has been almost completely neglected. He said American policy had been influenced by those who do not produce silver in quantity, but can occasionally profit handsomely from a low price, especially when an emergency arises. as in the case of war. He said that when an element of fear is present, first thought is to the intrinsic value

free market for gold in Canada. This market, he said, will give the man of moderate means his first real opportunity to buy or sell warehouse receipts for gold in large or small amounts. It will be the entering wedge to force a complete change in our fiscal policies, because it will reveal, once and for all, the truth about printing-press money. Taylor said that such warehouse receipts, or those plain small bars of gold they represent, may, as time goes on, replace currencies of uncertain value in world trade channels, no matter what promises, whose portrait, or whose signature may be engraved on the paper money to give it the pretense of value.

#### RESEARCH AND EDUCATION

R ESEARCH and Education were the topics discussed at a Wednesday afternoon session, at which Lee A. DuBridge, president, California Institute of Technology, presided.

Nuclear explosions and their possible mining applications were discussed by Gerald W. Johnson and

David D. Rabb, both from the University of California Radiation Laboratory. The full texts of these talks are printed in this issue.

In discussing the Role of Research in Marketing Metals, W. M. Peirce, assistant to the executive vice president, New Jersey Zinc Co., said that metals today face keen competition with each other and with non-metallic materials. Pointing out a few examples of what research has done for the metal industry in the past 30 years, Peirce stated that "research can aid in holding old markets and finding new ones, provided it is backed up by intelligent aggressive development and promotion." Peirce described the research program of the lead and zinc industry that is being carried on through the Lead Industries Association and the American Zinc Institute. It is his belief that such research will yield results, and that if these results are followed up with intelligence and aggressive promotion, the programs will pay dividends.

"Just as research workers during the 1940s were concerned with the problem of finding ways to conserve metals that were in short supply, they are now working to develop new uses for many of these same metals." This was the opening comment of R. H. Thielemann, chairman, Department of Metallurgy, Stanford Research Institute, in presenting his talk on "Research on New Uses for Mineral Products." He said that in practically every field, engineering technology has advanced to the point where the properties of available materials are being utilized to the maximum, and significant engineering improvements which appear possible are awaiting the development of better materials to do the job. In general, research in the field of metallurgy can fall into four broad categories—electrical and mag-netic materials; corrosion resistant materials; high strength and high strength - to - weight ratio materials. and high temperature materials.

John W. Vanderwilt, president, Colorado School of Mines, concluded the session with a paper on Supply, Demand and Future Outlook for Mineral Engineers. Basing his estimates on a thorough statistical analysis, he predicted that the number of mineral engineers to be graduated will be around 1900 next year, will increase to 2400 by 1963, and thereafter remain relatively constant for several years. Concerning future demands, he stated that engineering education has been and is being slighted and that, if continued, this trend will seriously affect the future outlook for mineral engineers. Pointing out that the trends in engineering education over a decade have been (1) toward greater emphasis on the fundamentals of the physical sciences, (2) a broader education, and (3) more graduate

work, he stated that engineering education holds the key to meeting the nation's over-all requirements for scientists and engineers. Future opportunities for the mineral engineer will continue to be excellent but prospective employers will be guided more and more by quality.

### STATE OF THE METAL MINING INDUSTRIES

FRANK COOLBAUGH, vice president of Climax Molybdenum Co., served as chairman at a session dealing with the State of the Metal Mining Industries on Thursday morning.

Three factors account for the current depressed state of the nonferrous metal mining industry, according to Simon D. Strauss, vice president, American Smelting and Refining Co., the lead-off speaker. First he said, the non-ferrous industry is in a depressed state because geologists and mining engineers have been extraordinarily successful in finding new deposits of base metals in the period since the end of World War II in all parts of the world, including the United States. Second, the Korean War and the subsequent programs to stockpile strategic materials caused many of these newly developed deposits to be equipped for production more rapidly than would normally have been the case, and, now that that stockpiling has largely ended, this means temporary overcapacity. And third, despite the fact that consumption of base metals in Europe and in certain of the new industrialized countries has made substantial gains, the use of copper, lead, and zinc in the United States has grown more slowly than expected. He urged the non-ferrous industries to step up their research and to press for use of these metals in the States in which they are produced as well as in other industrial areas.

Herbert C. Jackson, managing partner, Pickands Mather & Co., spoke on the outlook for the iron ore industry. He said "it is important that we recognize that the iron and steel industry, faced with rising labor costs, must produce its products as cheaply as possible to maintain its competitive position in this country against foreign imports of iron and steel products and its present large export position in foreign countries. This means that the iron and steel industry must utilize to the fullest extent its present blast furnace capacity in order to avoid large capital expenditures for new plants, and the maximum capacities of these furnaces can only be utilized if high-grade and properly prepared furnace feed is made available." He said the industry has to get its feed from those areas where the feed is of the highest

Walter L. Rice, president of Rey-



Program Chairman Frank Coolbaugh presided at the session dealing with the state of the metal mining industries

nolds Mining Corp. and vice president of Reynolds Metals Co. spoke on the light metals industry. He traced the rapid strides made by the industry since before World War II, but cautioned that the aluminum industry has been severely hurt by the dumping of Russian aluminum on foreign markets and imports of other aluminum into the United States. He said, "The Soviet Government can subsidize any commodity that may be selected for hit-and-run attacks on the Western markets. When aluminum is vulnerable it will be selected. Zinc, tin and platinum have already been singled out. If Russian eco-nomic warfare goes unchecked, don't be surprised if they some day select copper, lead or steel either to generate foreign currency in a particular market or to stimulate a recession at the most opportune time." The aluminum industry, he said, faces a healthy development of its end products and a spectacular future growth. He went on to say, "Our planning department forecasts doubling of the U.S. industry from 1955 to 1965 and quadrupling-to 10-million tons-by 1975. We believe our forecasts are conservative, taking into account population, technological improvements and progress in the research laboratories.

F. A. McGonigle, vice president of Howe Sound Co. reviewed the strategic minerals problems. Commodities included in his discussion were manganese, antimony, columbiumtantalum, cobalt, tungsten, mercury, fluorspar, chrome and beryl. Generally, figures indicate a reduction in domestic mining, consumption and prices for the first six months of this year. He pointed out that various Federal Government programs for strategics had expired or were about to expire, and although he drew no firm conclusion, the broad picture was not good for domestic strategic mineral producers.

The past, present and future of the rare metals was discussed by M. H. Kline, vice president of Rare Metals Corporation of America. In his discussion, he included beryllium, columbium-tantalum, gallium-germaniumselenium, rare earths, titanium-zirconium-hafnium, and thorium-uranium, pointing out that for many of these rare metals the future is much more encouraging than the present. said, "when a metal is first produced in quantity, its uses are limited and fabricators are reluctant to change established industrial patterns or to stand the expense necessary to develop markets for the sale of the new commodity, which almost immediately results in a surplus of the metal. On the other hand, when there is an inadequate supply of material, and good examples of this are columbium, beryllium, and tantalum, industry does not like to be dependent upon such a limited source of supply and will invariably prefer available substitutes.1

J. F. Corkill, vice president and general manager of Pacific Coast Borax Division of United States Borax and Chemical Corp., was enthusiastic over the future for boron. He said, "We feel that the boron industry has made very substantial progress during the first hundred years of its existence here in the United States. While it took nearly this period of time to reach an annual production rate of a million tons, it is my personal feeling that with the great amount of research work being done on various boron chemicals, and if the boron fuel is proven successful, within perhaps a period of only 5 to 10 years present production will again double."

W. Spencer Hutchinson, Jr., assistant to the manager of the Grand Junction Operations Office of the Atomic Energy Commission, dealt with the present state of the uranium industry. Speaking of the future, he said, "The commercial market, initially at least, will be for concentrates. AEC purchases after March 31, 1962 will also be confined to concentrates in order to conform to

private industry practice. Based on recent studies it appears that the domestic industry should be in a good position to compete at home and abroad with other uranium producing nations as a commercial market develops."

According to Hutchinson, atomic power will call for a major expansion of the uranium industry. He said, however, that we still cannot predict with certainty just when atomic power requirements will have an important impact on uranium production. He expressed the hope that by 1966, the consumption of uranium for atomic power requirements will reach substantial proportions. The Atomic Energy Commission's uranium requirements, which are now being covered by firm contracts, according to Hutchinson, will in themselves assure a high level of domestic production through 1966.

#### MANAGEMENT PROBLEMS

KINNEAR, JR., manager, Nevada Mines Div., Kennecott Copper Corp., served as chairman in place of C. D. Michaelson, general manager, Western Mining Divisions of the company at the Management Problems session on Thursday afternoon.

"The Role of Engineering in Management" was discussed by Tom Ware, president, International Minerals & Chemical Corp. He stressed that the role of engineering in management is much the same as the role of any staff component in management. Creative talent in the mining industry, Ware said, is called upon as never before-considering today's fast rate of depletion of high grade ores. He declared that the keenest kind of competition that exists throughout the mining industry requires the utmost ingenuity and energy of well-planned staff specialists rather than the energy of one outstanding man as has often been the case in the past.

Stressing the human aspects of effective staff accomplishments, Ware said, "Organization maturity starts with the quality of personnel, and it ends there too. Integration of staff services with a line function can be at once one of the most difficult and trying tasks for management and at the same time the most rewarding."

"Long Range Open Pit Planning" was described by Adolph Soderberg, consulting engineer-mining, Western Mining Divs., Kennecott Copper Corp. He covered such elements as the design of an open pit mine to produce maximum economy of operations, types of ore, pit limits, grade cutoff, stripping ratio and rate of production. These factors, Soderberg said, must be resolved to produce the lowest unit operating cost, regardless of market price which only affects the

determination of the pit limits in terms of limiting stripping ratio and grade of ore. He pointed out that the basic criteria in long range open pit planning is cost, not market price of the end product.

Robert O. Hawkanson, vice president-administrative, Oliver Iron Mining Div., U. S. Steel Corp., presented a talk on the engineer training program in effect in his company on the Mesabi Range. He described the methods used for determining annual requirements of engineers and for the selection of engineering graduates, and he gave the procedure followed in connection with a formalized on-the-job "rotational type" training program for such personnel. He outlined the procedures by which the program

Health session which featured five talks by specialists in their fields.

Jack Warren, Chief Ventilation & Industrial Hygiene Engineer, of the Anaconda Co. talked on "The Science of Mine Ventilation," supplementing his talk with a number of effective visual aids. He cited some unique methods which have been used to promote the science of mine ventilation and to improve the working environment of underground miners. Two methods were described by which normal forced draft airflow cooling was supplemented by air conditioning systems using mine water as a heat transfer medium. Other methods described by Warren are the use of wood-stave pipe, which provides perfect insulation, to transmit atmos-



Tom Ware discussed staff functions in modern corporate management

is administered, compensation practices, the orientation of the young engineer, and the factors which were given consideration in developing the program.

A somewhat different sort of training program was described by John M. Petty, assistant general superintendent, Climax Molybdenum Co. in his paper, "Supervisory Development Program." Petty explained that the greatest efforts of his company during the past ten year period were directed toward accomplishing an ever-increasing production goal, but that now, after meeting the production demand, it is evident that attention must be directed toward improving costs and efficiency. Management felt that the greatest area for improvement was through the first-level supervisors and, accordingly, a supervisory development program was instituted. A variety of subjects has been included in the program, starting with interpretation and administration of the union contract, and successively covering definition of responsibility of all levels of supervision, company policies and practices, leadership, planning and control, engineering standards, and others.

#### SAFETY AND HEALTH

MARLING J. ANKENY, Director of the U. S. Bureau of Mines, served as chairman of the Safety and pheric air distances of several miles. The air is actually cooled in the process because of adiabatic compression in the air column in the wood-stave pipe.

"Future Aspects of Underground Ventilation" was the subject of the second talk by Raymond Mancha who pointed out that mine ventilation will become more difficult as existing ore deposits are depleted. He predicted that there will be greater dependence on recirculation of the air reaching the working places, necessitating the filtering of dust contamination in the air. He said that there will be more need for artificial cooling of the air delivered to working places in hot rock workings. The outstanding advances in mine ventilating practices, however, were predicted to be a stricter observance of the many established basic principals that have been neglected during periods of easy-to-get ore when almost any type of mine ventilation seemed to suffice.

Charles R. Kuzell, Director, Phelps Dodge Corp., in his presentation, "Safety in the Mining Organization," reviewed the mining industry's accomplishments in eliminating accidents over the past half century. He presented figures to point out conclusively the value of organized safety programs, and he enumerated the fundamental principles of a good program of accident prevention as (1) strong, sincere policy, (2) complete

organization, (3) education in safety consciousness, (4) protective measures, (5) statistical analyses, and (6) enforcement. Kuzell went on to explain each element and pointed out the benefits of a well executed safety program.

Duncan A. Holaday, Sanitation Engineer-Director of the Occupational Health Program of the U.S. Department of Health, Education and Welfare, presented a talk on "Radiation Hazards in Uranium Mining." described the harmful effects of external gamma radiation and inhaled radioactive dust and gas to workers who are exposed to these conditions. He told of studies that had been made of radiation exposures in uranium mines which show that the greatest hazard is probably produced by radon daughters and that practically all mines will require mechanical ventilation to reduce the atmospheric concentrations of these elements to a safe working level. Safe field methods are available for measuring daughters and for estimating ventilation requirements.

"Direct and Indirect Costs of Mine Accidents" was the subject of the next talk by Herbert R. Westlund, Chief Safety Engineer, Argonaut Insurance Co. Since the direct costs of accidents are in general covered by insurance, Westlund said, it is not too difficult to keep accurate records of them. Indirect costs, on the other hand, include widely varying considerations for each accident. This has led to the acceptance by management of an arbitrary ratio of indirect costs to direct costs in the area of 4 to 1. Westlund contended that management today requires more accurate figures as to the indirect costs of accidents and stated that "if you can prove actual costs instead of citing ratios, you will get a more attentive ear for your accident prevention program."

#### EXPLORATION AND GEOLOGY

A THURSDAY morning session under the chairmanship of Peter Joralemon, Consulting Geologist of San Francisco, was comprised of four talks on the most recent methods being employed to find new ore bodies.

Stanley E. Jerome, District Geologist, Bear Creek Mining Co., in his paper, "Exploration of Large Areas" described the geologic philosophy of reducing large areas to much smaller. particularly interesting ones which warrant greater concentration that will lead to fair chances of success. He recommended a two-stage process in which first, an indirect appraisal is made on 1: 5,000,000 or 1: 2,500,-000 geologic, techtonic and commodity maps, and second, a direct appraisal which uses all available tools that are applicable-such as aerial reconnaissance; prospecting and field geology; geochemical exploration; aerial geophysical exploration; ground geophysical exploration and drilling, driving and sinking techniques.

"Exploration Procedure at Inco" prepared by the Geological Department of International Nickel Co. and presented by C. E. Michener, Vice President, Canadian Nickel Co., Ltd., for Ralph D. Parker, vice president in charge of Canadian operations of International Nickel Co. of Canada, Ltd., was the subject of the next paper which described the company's exploration activities in areas outside the Sudbury district following World War II. Michener explained the use his company has made of various geologic and geophysical techniques and explained the limitations of any single method that is applied to precambrian formations in Canada, Geochemical methods, Michener said, might be useful as a third screening method in special cases, but his company's experience to date would indicate that it is not adequate. He described the need for new screening methods as a very challenging subject for the geologist, geophysicist and the geochemist.

Louis B. Slichter, Director, Institute of Geophysics of the University of California at Los Angeles, told his attentive audience that progress in geophysical prospecting is easy to see, because advances often take the form of "physical hardware" or new procedures of search. He suggested, however, that the hidden progress in the understanding of theoretical aspects of geophysics is more significant. Observing that the understanding of all aspects of prospecting - geological, geophysical and geochemical-is being increased through research, Slichter stressed the importance of basic research in exploration techniques. His studies indicate that fewer than 50 scientists in this country are essentially full time researchers in mining exploration.

V. N. Burnhart, Vice President, E. J. Longyear Co., in his presentation, "Exploration Drilling Techniques" discussed the numerous advances which have been made in recent years in exploration drilling. Among these are drill hole circulating pumps, in-dustrial diamonds and diamond bit design, "W" series drill rods, combination plug and core drilling, unitized truck and scow mounted vertical and angle hole rigs, drill hole stabilization, and wire line tools and techniques. All of these have been important in contributing to improved results and, despite continually rising labor and material costs, have reduced the average cost per foot of hole over the past ten years. Burnhart predicted further signficant improvements in synthetic diamonds, drill hole stabilizing agents and small diameter percussive down-the-hole drilling tools.

#### MILLING & METALLURGY

THE Monday afternoon session on Milling and Metallurgy set the pace for the operating sessions which followed. Five excellent papers were delivered under the chairmanship of Frank Buchella, general manager, San Manuel Copper Corp.

Harlowe Hardinge, president, Hardinge Co., Inc., presented a comprehensive review of "Autogenous Grinding." His paper was published in the October issue of MINING CONGRESS JOURNAL.

One of the best known men in the field of mineral dressing, Arthur W. Fahrenwald, Dean Emeritus, College of Mines, Unversity of Idaho, Moscow, Idaho, described "The Gyratory Ball Mill; Its Design, Principle of Operation and Performance." The mill has been the subject of research by Fahrenwald for several years. report of a duration test with a small unit by independent engineers, and in an independent research laboratory grinding copper and zinc ores, gave the following: Ball potency, 300 percent; efficiency, 125 percent; and ball and liner wear, 48 percent-as against 100 percent for a 10-ft commercial tumbling mill. The gyratory mill has no "critical speed"; and speed of gyration, power consumption, and ball potency are limited only by the mechanical endurance of machine parts.

The Engineering Experiment Station at the University of Utah has had an active project in bulk solids flow for the past two years. Andrew W. Jenike, project director, described its work in the paper, "Scientific work in the paper, Principles of the Flow of Crushed Material," written by himself, P. J. Elsey, assistant director, and R. H. Woolley, research engineer. problem of flow of crushed materials," Jenike stated, "is essentially one of stress analysis." He said that the Experiment Station has perfected a method of measuring the flow-factor of bulk materials, which is a strength property governing flowability, and is working on the determination of stress

In these days of high prices everyone is looking for ways to cut costs. Mining men learned the ABC's of control engineering with such terms as "transducer," "reset," "lags" during C. M. Marquardt's address, "The Practicability of Present Day Plant Automation." Marquardt is president and founder of Industrial Physics & Electronics Co. He said most of the instruments or "hardware" for a high degree of plant automation have already been developed. What is needed most are trained control engineers who can apply the known principles. "Control engineering has not reached the high degree of application in the minerals industry because of a lack of interest and understanding by management, who have been content to ride the tide," Marquardt said. His conclusion was that the application of far more metallurgical plant automation is entirely practical.

"New Trends in Plant Design" presented by R. T. Lassiter, New York district manager, and J. H. Jensen, staff project engineer, Western Knapp Engineering Co., gave the audience an excellent review of new trends and technology in plant design and their relationship to plant capital and operating costs. The authors felt these trends were gradual rather than radical and the incentive was designing and operating for maximum profit. Several factors were described as those which tend to reduce plant capital costs.

RED D. DEVANEY, director of Metallurgy & Research, Pickands Mather & Co., chairmaned the second Milling and Metallurgy session of the Convention which was held on Tuesday afternoon.

"Dry Concentration of Magnetic Ore" was the subject covered by P. E. Cavanagh, director of metallurgy, Ontario Research Foundation. He said that a 11/2-tph pilot plant has been designed and built by the Foundation for dry grinding and magnetic concentration of low-grade magnetite This plant has now been in ores. operation for one year, during which time tonnage samples of ten different ores have been processed. "The results so far," Cavanagh said, "indicate the possibility of obtaining at least as good grade of concentrate and recovery of magnetic iron on many ores as would be obtained with crushing, wet grinding and wet concentration."

New techniques which have been developed in the application of high tension separation to beneficiation of iron ores were covered in "Iron Ore Beneficiation and High Tension Separation," written by Roger E. Barthelemy, director of research, and J. Hall Carpenter, president, Carpco Research & Engineering, Inc. Carpenter delivered the address and showed comparative data which illustrated the versatility of the technique that permits dry beneficiation of mixed magnetic and non-magnetic ores without any prior alterative high temperature treatment. Results of laboratory testing and pilot plant work covering the successful beneficiation of new Canadian iron ore deposits were given, and the applicability and limitations of the method to different iron ore minerals were discussed.

A color movie was featured in the presentation entitled, "Production of Metallic Iron Involving Direct Reduction." The paper, written by Alex Stewart, president retired, R-N Corp., and delivered by J. S. Breitenstein of R-N, gave listeners a chance to become familiar with one of the most important metallurgical advances of

the past decade-direct reduction of iron ore. The process, which Stewart described in detail, can profitably treat low-grade ores which have heretofore been classed as marginal ores of little or no economic value. He said the process is not restrictive as to grade of impurities in the feed, does not require high cost metallurgical coking or carbon fuel, treats high-grade standard commercial ores and lowgrade ores with substantially equal efficiency and produces metallic iron products in the range of 95 percent total iron and less than 2 percent silica.

William L. Lenneman, metallurgical engineer, Raw Materials Division, U. S. Atomic Energy Commission, presented a comprehensive review of the newer developments in uranium milling in a paper coauthored with F. E. McGinley, chief, Procurement Services Branch, AEC Grand Junction Operations Office. In "Remarks on Some Advances in Uranium Ore Processing," the authors covered such subjects as autogenous grinding in the Canadian Bancroft area mills; new techniques in leaching uranium ores; the acid saving circuits of the Algoma-Elliot Lake mills; copper-ammonium oxidation in alkaline leaching circuits; recent developments in ionic exchange and salt and extraction techniques which include vanadium recovery and the production of a metal grade UF4 from sulphuric acid mill leach liquors.

Listeners stayed to the end of the session to hear an interesting presentation of "Improvements in Filtration," by Robert B. Thompson, of The Eimco Corp. With the help of some clever visual aids, Thompson summarized the progress in liquid-solid separations. The improvements he discussed included sizing of filters, flocculation of pulps, and the mechanical developments in filtration. Thompson quietly emphasized the importance of his subject by pointing out that liquidsolids separations have become more and more important in process metallurgy. Therefore, as processes become more complex and capital costs higher, the need for more economy in operation and precise sizing of equipment

#### **OPEN PIT MINING**

THE first Open Pit Mining session was held Tuesday morning with Walter C. Lawson, vice president and general manager, Phelps Dodge Corp., as chairman.

A fellow copper miner, E. D. Spaulding, resident manager, Pima Mining Co., presented a paper entitled "Incline Skip for Open Pit Hoisting." He explained that four or more mines on the Iron Range have transported material successfully from open pits with skip systems incorporating an inclined railroad and a hoist to lift the cars, but the skip

installed at the Pima Mine is the only such system in operation in the Southwest, although two others were being contemplated or are in the construction stage now. An expenditure of \$1,075,000 for a fleet of 25 trucks, Spaulding explained, would have been required for a complete truck haulage system, while a combination skiptruck system, required an initial investment of \$1,244,000. The important point is that substantial savings have been realized by making a direct haul road out of the pit unnecessary. It is estimated that it would require the movement of 3,200,000 additional yards at a cost of \$1,710,000.

After the first speaker, the nearcapacity audience turned its attention to John A. Lentz, Jr., general superintendent, Morenci Branch, Phelps Dodge Corp. Lentz's subject was "Large Diameter Blast Hole Drilling and Blasting." To most mine operators in the Southwest who are engaged in open pit mining of porphyry coppers, the term, "large diameter blast holes," now means 9 or 12-in. rotary-drilled vertical holes. As for Phelps Dodge's own drilling and blasting experience at Morenci, the company has found that in rock which naturally fragments well, 12-in. diameter blast holes offer marked advantages over 9-in. holes.

A detailed description of "Drilling and Blasting Taconite" was given by Floyd W. Erickson, manager, Babbitt Division, Reserve Mining Co. Erickson described the rock at the company's operation as hard and unsuited for mechanical drilling. Therefore the jet piercer drill has been found most effective. He said that it is necessary to drill and blast multiple rows of holes using a standard hole-loading of blasting agent, deck loading, and where possible ammonium nitrate prills to achieve the best fragmentation. Because of the variable terrain, resulting in different bench heights, several methods of tying in the blasts are used to increase or decrease the height of muck piles and prevent cutoffs. Erickson concluded by saying, "The results have increased the life of all wear parts on shovels and primary crusher and increased shovel efficiency.

At the "Symposium on Ammonium Nitrate Blasting," four speakers presented short, but extremely informative papers on the use of AN at their respective operations. First speaker was Frank Quilici, pit superintendent, Nevada Mines Division, Kennecott Copper Corp., who said that it appears that his company has taken full advantage of the economies made available by the technological advances in the use of agricultural grade ammonium nitrate and fuel oil mixtures. Quilici discussed the use of ammonium nitrate prills to blast wet holes. The AN prills and diesel fuel are poured into water resistant tar-lined sacks to produce an eight by 40-lb cartridge which are loaded in the conventional manner.

H. E. Farnam, Jr., manager of operations, Iron Ore Co. of Canada, related how his company has gradually switched to fertilizer grade ammonium nitrate for 80 percent of its blasting. Covering the history of developments in blasting with AN in his company, he said that, in 1956, with the aid of Dr. M. A. Cook of the University of Utah, engineers began developing an explosive agent that would be compatible with water and would be more powerful than ammonium nitratefuel oil mixtures. "After two years of development work," Farnam said, "we now have explosives that can be handled in bulk, that are water compatible and have excellent power characteristics." He emphasized that the development of an inexpensive primer to work in conjunction with these explosives was an important part of the development program. The explosive covered in Farnam's paper consists of ammonium nitrate, TNT, and water.

Lewis J. Patterson, manager, Northern District, Michigan Limestone Division, U. S. Steel Corp., devoted his paper primarily to the techniques and theories employed in the use of ammonium nitrate and its associated compounds in blasting a high calcium limestone. Patterson said that several techniques were worked out which, to his belief, appeared to be highly important to the over-all efficiency of the blast. These points were described in detail.

James Hyslop, president, Hanna Coal Co., Division of Consolidation Coal Co., wrapped up the session with a discussion of why his company selected AN as an explosive. The reasons were essentially: (1) safety and (2) cost. The August, 1958 issue of Mining Congress Journal carried an article by Hyslop covering his company's findings.

CHAIRMAN of the second Open
Pit Mining session was Richard
W. Whitney, vice president, Hanna
Coal & Ore Corp.

"Over-All Berkeley Pit Operation" was described by E. J. Renouard, manager of mines, The Anaconda Co. He referred to the pit as the latest copper producing unit for The Anaconda Co., and said it adds a new type operation in the Butte area and augments production of the deep vein type mines and the Kelley block cave mine. Stripping operations started in March of 1955, and the first ore was shipped in December of the same year. "Through August 31, 1958, about 11,115,000 tons of ore were shipped and 46,572,000 tons of waste removed." Renouard stated. Renouard's presentation was illustrated with several slides and covered all of the broad aspects of the operation.

Victor I. Mann, vice president, Lake Asbestos of Quebec, Ltd., kept his audience interested with an up-to-date progress report on a challenging new mining project. In "Progress at Asarco's Black Lake Asbestos Project," he gave an account of the work entailed in preparing the mine and its 4000-tpd asbestos mill for operation. Mann's paper was published in the October issue of MINING CONGRESS JOURNAL.

"Truck Haulage Improvements" were covered by two men—one from the copper industry and one from the iron industry. J. C. Van De Water, general superintendent of mines, Ray Mines Division, Kennecott Copper Corp., spoke first. Van De Water discussed the growth of truck haulage over the past 15 years and pointed out that today there are four rail pits and 11 truck pits in operation in western copper mines. In addition, all of the rail pits use trucks to supplement rail to some degree. The tonnage now being mined by trucks is new tonnage from ore bodies whose size, shape and



Large crowds inspected the exhibits

location made them uneconomical or impossible to be mined by rail. The fact that trucks have made possible nearly a 100 percent increase in openpit copper production is certainly a major contribution to the mining industry.

Continuing on the same subject, L. J. Morgan, supervisor, Mobile Equipment, M. A. Hanna Co., defined truck haulage improvements as anything that lowers the unit cost of moving bulk material, which could include operational, maintenance or design factors. Improvements that can be made on equipment already in use are: (1) use of bigger engines; (2) better cooling systems; (3) more effective air cleaners, and (4) oil changes based on a definite test program rather than a certain number of hours or miles of operation.

Oliver Iron Mining Division has developed a carefully organized program of planning and scheduling open pit and plant maintenance that has shown outstanding results. This program was explained in James A. Vitzthum's paper, "Planning and Scheduling Maintenance." His paper has been published in this issue of MINING CONGRESS JOURNAL.

#### **UNDERGROUND MINING**

TUESDAY'S Underground Mining session was presided over by Chester H. Steele, vice president, The Anaconda Co.

A report of the Survey of Underground Drilling Practices which has been conducted by the AMC Underground Drilling Committee was presented by Raymond M. Stewart, assistant planning engineer, Climax Molybdenum Co. The report reviewed current underground drilling practices as gathered from over 60 companies which responded to a questionnaire distributed to the industry during the current year. The report covered in detail the practices of these companies in all phases of rock drill, drill steel and bit use in underground mines. In summarizing the survey, Stewart said, 'We have the information and reasons for current practices which may provide a stepping stone toward the needed improvement and development.

Underground blasting at Eagle-Picher Company's lead-zinc mines in the Tri-State district was discussed by Joseph B. Elizondo, general su-perintendent of mines. He gave the results of the trial work in the use of prilled ammonium nitrate mixed with diesel fuel in 21/2-in. underground blast holes 10 ft deep. The uncoated prills, mixed with diesel fuel (one gal per 100 lb) are packed in 1%-in. by 16-in. pre-waxed paper shells. A 10ft blast hole is loaded with approximately 8 lb of the shelled prills and 2 lb of 60 percent ammonia dynamite. The dynamite is spaced between the prilled cartridges in such a manner as to act as an effective booster, and the charge is detonated with cap, fuse and Primacord.

Richard M. Stewart, assistant to director of mining research of the Anaconda Co., presented some of the highlights of a symposium on hydraulic stope fill sponsored by the Montana School of Mines in his talk, "Hydraulic Filling in Under ground Mines." Stewart recounted the advantages of using sand for underground fill instead of sand-rock mixtures and described methods used to deslime mill tailings and transport them hydraulically into the mine area to be filled. He described the hydraulic filling methods under conditions where existing wall rock is solid enough to stand until stoping is complete, as well as under heavy ground conditions where the hydraulic filling operation must be integrated into the stoping cycle. He observed that "hydraulic filling is faster than waste rock filling, hence it is possible to devise a faster mining cycle which improves ground conditions, often permitting the use of a less expensive mining method."

"Freezing Operations for Shaft Sinking in Saskatchewan" was the subject of a paper written by Joseph B. Cummings, administrative assistant in charge of exploration and development, and Russell G. Haworth, vice president in charge of production, Potash Company of America. Cummings, who made the presentation, said that the potash bed is about 3500 ft deep and the overlying material contains unconsolidated sands interbedded with shales and sandstones. Also many of the overlying strata were water-bearing with pressures ranging up to 800 lb per sq in. This brought about the decision to freeze to 3000 ft in depth in order to guarantee success in shaft sinking. The methods used for controlling and recording the temperature were described in detail.

Theodore F. Adams, project manager, Blue River Constructors, presented the final paper of the session, "Roberts Tunnel Project for the City of Denver." He gave the mining in-dustry a "contractors eye" view of a major tunnelling operation-a function closely akin to drifting operations in mining. Besides straight tunnelling, the job involved sinking a 916-ft deep, 16-ft circular, concrete lined shaft. The tunnel is being advanced from four headings-one at each portal and two others in either direction from the shaft bottom. Adams described all of the equipment used in each phase of the operation.

ELMER A. JONES, division manager, St. Joseph Lead Co., was chairman of the Underground Mining session on Wednesday morning.

Philip M. Lindstrom, superintendent of Utah operations, Hecla Mining Co., gave a talk on "Longwall Stoping With Yieldable Steel Props at the Radon Mine" which was prepared by himself and William H. Love, manager of mines at Helca. MINING CONGRESS JOURNAL printed the full text of Lindstrom's talk in the August 1958 issue.

Harry L. Miller, superintendent of Jefferson County operations of the American Zinc Co. of Tennessee, presented a paper entitled "Mechanical Mining in Eastern Tennessee." Miller described the applications of various types of mechanical equipment, including both track and rubber-tired loading and haulage units and discussed the problems encountered when new machines were put to use, along with the measures taken by management to solve these problems. He pointed out the areas where each piece of equipment works best and stressed that proper operation and maintenance are an absolute requisite to efficient machine use.

"Mining by Hydraulic Jet" was the topic of a paper by J. H. Baker, assistant production manager, American Gilsonite Co., in which he described the cutting of gilsonite, a solid hydrocarbon, from a vertical vane by high pressure water jets mounted on tracktype vehicles of 50 to 60 tons per hour. The water used in the cutting process

plus additional fluming water, he said, is used to transport the gilsonite  $2\frac{1}{2}$  miles to a sump, from which it is transported to the surface by a series of horizontal centrifugal pumps. Surface transportation 72 miles over a mountain range to the company's refinery is also performed hydraulicly after further preparation and adjustment of solids concentration at the mine surface plant.

William F. Shinners, manager -Michigan mines, The M. A. Hanna Co., in his paper, "Why the Circular Shaft?" recounted the reasons why his company decided on a concretelined circular shaft to serve two adjoining mines, replacing two inadequate shafts. The Koepe hoisting system was incorporated into the steel headframe design. The man and supply cage will be double deck, with a capacity of 100 men and skips will be of 14 ton capacity and capable of hoisting at the rate of 450 long tons per hour from a depth of 2600 ft. Shinners said that management is satisfied that the circular shaft is cheaper for this particular application; it cost less to sink, and additional savings will be apparent in decreased maintenance after several years of operation.

Robert W. Braund, manager of Michigan mines, and Russell L. Balconi, superintendent of the Tracy mine, Jones & Laughlin Steel Corp., collaborated in the preparation of a paper on "The Use of Metal Liners in Ore Passes." Braund made the presentation. This paper was published in the October issue of MINING CONGRESS JOURNAL.

#### INDUSTRIAL MINERALS

THE Industrial Minerals session on Thursday morning under the chairmanship of C. E. Wuerpel, vice president of Marquette Cement Manufacturing Co., featured a panel of outstanding authorities on the production of nonmetallics.

Astronomical figures always crop up in any discussion of industrial minerals and the address "Impacts of the Federal Road Program on the Mineral Industries" given by C. D. Curtiss, special assistant to executive vice president, American Road Builders' Association, was no exception. His paper traced the development of the Federal Aid Highway Program from its inception in 1916, with an appropriation of \$5,000,000 for the fiscal year 1917, up to 1958 when \$3,400,-000,000 was apportioned among the states for the greatly expanded programs sponsored by the present administration. The impact of this huge program on the mineral industries will be considerable, both direct and indirect. For each \$1,000,000 of construction contracts, State and Federal highway agencies will require about 646 tons of steel products, 79,000 tons of aggregates, 17,000 bbls of cement, 133,000 gal of motor fuel and lubricants, 31,000 lb of explosives, plus hundreds of tons of other products.

C. M. Gilliss, California director of Public Works and chairman of the California Highway Commission, gave AMC listeners a forecast of some of the probable requirements of raw materials for California's highway program for the fiscal years 1959-60 in his address, "Raw Material Require-ments for the Federal Road Program." He predicted the approximate quantities and dollar values of required Portland cement concrete for structures and for pavements, asphaltic and bituminous mixes, cement, asphalts and untreated rock base. The predictions were based on an estimate of the 1959-60 California highway



An excellent series of papers on industrial minerals was presented

construction budget, and were derived by applying to the budget factors relating dollar value of contracts to quantities of specific materials.

In 1955, the Southwestern Portland Cement Co. installed two conventional shaking-type, bag-house dust collectors on short dry-process kilns at the company's El Paso plant. Gordon W. Barr, production engineer with the company in his paper entitled "High Temperature Gas Cleaning in Cement Plants Using Fabric Filters" reported that experience with the El Paso installation, and at a pilot plant installation, prompted the company to design and build a full-scale unit for a 101/2 by 330 ft gas-fired wet process kiln at Victorville, Calif., in 1957. Normally, 95,000 cfm of gas at 550° F is filtered by this unit with no visible dust loss to the atmosphere. A general cycle of deflation cleans the bags without destructive flexing and popping. The unit is completely enclosed and waste gases escape through an opening under the roof eaves.

In the last talk of the session, James Hicks, research director of the Chemical Division, Kaiser Aluminum & Chemical Corp., presented "The Use of Industrial Minerals in Basic Refractories." The sources and the physical and chemical qualities and methods of preparation of refractory chromites, magnesites, dolomites, olivine and accessory minerals were covered, along with an indication of the ways in which these materials are made into products. An interesting facet of Hicks' subject was that increasing demands being made upon refractories by ever-increasing production rates in the metallurgical industries may soon result in a shortage of raw materials.

#### **URANIUM**

THE last session on the program, Uranium, attracted an enthusiastic audience. Vanadium Corporation of America's vice president, D. W. Viles, presided over the session.

The first speaker to address the audience, on "Nuclear Energy and the Future," was R. D. Bennett, manager of the General Electric Vallecitos Laboratory; but illness prevented his attendance. In his place, Dr. M. J. Sanderson, research specialist in atomic materials from the Vallecitos Laboratory, presented Dr. Bennett's paper. Some of the implications of the almost unlimited temperature levels attainable by fisson reaction were discussed, and the present status of efforts to apply the fission process to the generation of power was reviewed. "The question seems not to be 'whether' we shall use nuclear power ex-tensively, but merely 'when,' " Bennett stated. "We in General Electric feel that the time is soon. Our installations in San Jose and at Vallecitos are prepared to exploit each breakthrough, large or small, toward reducing the cost, increasing the availability and extending the application of nuclear power."

Texas-Zinc Minerals Corp., jointly owned by The Texas Co. and the New Jersey Zinc Co., started production of uranium concentrate in their Mexican Hat, Utah, mill last November. project was described by Neill K. Banks, general manager, Texas-Zinc Minerals Corp., in his talk "Texas-Zinc Minerals Project." Banks said the 800-ton mill, located near the San Juan River in Southeast Utah, treats ores from the company-owned Happy Jack mine in the White Canyon area of the State and from over 25 independent mines in southeastern Utah and northeastern Arizona. Major problems of transportation, power, communications, and those imposed by construction of all the facilities necessary to support a community of 600 were described. Acid leaching followed by a unque method of solvent extraction using Podbielniak Centrifugal Contactors was outlined as the process used for treating the uranium ores. Banks said that the process has proven efficient and that expected results are being obtained.

"Open-Pit Uranium Mining in Wyoming" was outlined by Albert V. Quine, general manager, Lucky Mc Uranium Corp. His paper included a brief description of the geology of the Gas Hills area, classification of pits, and general problems of the area as pointed up by the procedures followed in the Lucky Mc operations. Quine said the procedures used by Lucky Mc could more or less apply to all of the larger operations in the area, either operating at present or contemplated in the near future. He included such procedures as exploration-development drilling with its attendant problems of drill hole spacing, stratigraphic and radiometric logging, and calculation of ore reserves and stripping ratios required for pit Quine presented operating cost data which indicated a considerable divergence depending on the nature of the ground, topography, size of pit, etc.

Two papers concerning the same subject, "Mining Below the Water Table at Ambrosia Lake," were given by Ray Jenkins, superintendent of mines, Phillips Petroleum Co. and Richard J. Stochr, superintendent of mines, Homestake-New Mexico Part-Jenkins told how one of the ners. three Phillips-owned and operated mines, located in the Westwater Canyon member of the Morrison Formation, is now in production from a depth of 660 ft. Also, circular concrete-lined shafts are now being sunk at the Sandstone mine and the Cliffside mine which will be put into production at the 1000 and 1500-ft levels respectively. The orebodies are developed by strike drifts running at right angles. The pillars will be extracted by open end or window methods. Jenkins said some slot stoping may have to be done in conjunction with sand filling in the thicker area. At the present, the water is settled in dams near the working faces, and pumped to the mine pump station where it is cleared once. From there it goes to surface desilting ponds before going to the mill.

Continuing on the same subject, Richard Stoehr said that Homestake Mining Co., as general partner of two limited partnerships, is developing four mines in the Ambrosia Lake Uranium District. In three of the mines most of the ore is 150 to 300 ft below the static water level. The ore occurs in a sandstone formation which is a pretty good aquifer. Preliminary test work indicated considerable quantities of water would be encountered in developing these mines. To date the quantities of water encountered have been well below the estimated figures. Stoehr said that the water has caused some problems in ore handling, pumping and loss of values in the mine water. He emphasized, however, that none of these problems seem insurmountable and a great deal has been accomplished to overcome them. One technique is that of placing main haulage and drainage drifts below the ore level. date, this method of drainage has produced encouraging results.



The Mining Show gives an unparalleled opportunity to study and compare the latest developments in all types of machinery and equipment for doing a better job in mining and mineral processing operations

# CONTINUOUS MINING in THIN SEAMS

CONTINUOUS mining had its origin in the thicker seams of coal in Illinois, Indiana, and later at Eastern Gas & Fuel Associates' Federal No. 1 mine in northern West Virginia where the Goodman boring type continuous mining machine is now used extensively with satisfactory results. Following this, the coal company worked with manufacturers of mining equipment to develop a continuous mining machine suitable for mining in seams under 48 in. high. Eastern Gas now has low-coal type continuous mining machines operating in its three Pennsylvania mines at Melcroft, Sonman and Colver. The results obtained from these continuous mining machines under varied seam and mining conditions compared with mobile loading will be briefly summarized in this article.

#### Melcroft Mine

The Melcroft mine is located on an anticline that dips in a southeasterly direction on an average of four percent, with local grades up to 12 percent. The seam of coal mined is the Lower Kittanning, known locally as the Miller or "B" seam, and ranges in thickness from 28 to 48 in. Immediate roof is dark shale except in low-coal areas where it is a very hard sandstone. Average cover runs from 200 to 400 ft.

Approximately 50 percent of the output is continuous mining machine coal. With conventional mining, the operation produces an average of 18 tons per crew man compared with an average of 36 tons produced per crew man with continuous mining machines.

A typical continuous mining machine crew consists of one foreman, one machine operator, one pick up loader operator, two roof bolters, one utility man and one boom man. Equipment includes a 76-AM Colmol, Joy 12 BU loader, Piggyback, room conveyor, mother conveyor, elevator and mine cars.

Rooms (see accompanying sketch) are driven 325-ft deep on 50-ft centers and 27 ft wide. The Colmol takes BU lifts 9½ ft wide to a depth of 20 ft. Minimum cutting height is 38 in. and maximum is 48 in. In butt entry work, No. 1 and 2 entries are driven. While rock is being taken in No. 2 entry for height, No. 3 entry and rooms on the right side are driven.

Briefly, the flow of coal from the room face is as follows. A Joy loader, operating behind the continuous minHow do low-coal type continuous mining machines compare with mobile loading units under varied seam and mining conditions?



By W. J. B. MAYO Northern Division Manager Eastern Gas & Fuel Associates

ing machine, discharges coal onto a Piggyback which conveys the product to the room conveyor pan line. The chain conveyor discharges the coal into an elevator which finally loads it into 2½-ton mine cars which are equipped with collapsible side boards.

Sonman Mine

The Sonman mine is located on an anticline that dips to the southwest on an average five-percent grade with some local dips up to ten percent. Mining is done in the Upper Freeport or "E" seam, which has an average thickness of 48 in. There is a slate band two to three in. thick about 12 in. from the bottom of the seam. The top of the seam is six to ten in. of rooster coal. The immediate top is shale, but in some areas the mine has laminated sandstone which must be supported very closely with timbers or roof bolts. Bottom consists of fire clay. Average cover runs from 350 to 800 ft.

Approximately 65 percent of the output is produced with continuous mining machines. Under the conventional system of mining the mine produces an average of 17 tons per crew man compared with an average of 35 tons with continuous mining machines.

A typical continuous mining machine production crew consists of one foreman, one machine operator, one pick up loader operator, two shuttle car operators and one utility man. Equipment includes a 76-AM Colmol, a 14 BU Joy loader, two 6 S-C shuttle cars, an Irwin belt loader, and a Jeffrey 30-in. butt entry belt which empties into mine cars.

Rooms are driven 18 ft wide for a distance of 280 ft. Twenty-ft pillars are mined on retreat. Roof bolts and steel headers are used for roof support.

The cutting head of the 76-AM Colmol has five bottom cutting arms, with a total of 25 bits and 5 core breakers, and 10 top cutting arms with a total of 30 bits. Cusp cutters on the top of the head shear the roof uniformly





At the Melcroft mine the chain conveyor discharges coal into an elevator which loads into 2 1/2-ton mine cars equipped with collapsible side boards

belt. The shuttle cars discharge onto a 30-in, conveyor belt.

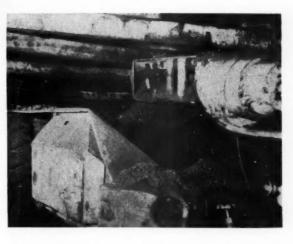
The continuous mining machines consist of 76-A Colmols, and Joy 3 JCM machines. The 3 JCM has a ripper-type head consisting of six cutter chains using a total of 120 bits. A place 16 ft wide is driven

#### Colver Mine

The Colver mine is located on the flank of an anticline that dips between five and six percent in a northwesterly direction with local grades up to 15 percent. The seam mined is the Lower Kittanning, known locally as the Miller or "B" seam. It ranges from 35 to 48 in. in thickness and is comparatively free of streaks and impurities. Where bone coal is found, the immediate roof is slate; where bone coal is absent, the immediate roof is sandstone. main bench is separated from a high ash bottom bench by a hard slate band several inches thick which forms the bottom upon which mining operations are conducted. Average cover runs from 300 to 600 ft.

With the exception of two mobile loading units exploring in very low coal areas from which production is negligible, almost 100 percent of the output is produced with continuous mining machines. However, prior to the advent of 100 percent continuous mining at this operation in the year 1955, the transition from conveyor mining and mobile loading was a "must" in order to meet the economic demands of the market. A typical continuous mining machine production crew consists of ½ foreman, one continuous mining machine operator, two shuttle car operators, two timbermen, and ½ rock duster.

The Colver operation is equipped
with both 76-A Colmols and 3 JCM
ripper-type machines. The view
shows a 3 JCM discharging into a Joy
32-E shuttle car.
Dual wheels were
installed on the shuttle car to negotiate
steep grades



Because of bad roof conditions, which require close and heavy timbering, the mine produces an average of 30 tons per crew man on Colmol sections compared with about 18 with a Joy or ripper type continuous mining machine. Timber must be kept ahead of the operator at all times and consists of 5 in. by 8 in. by 14 ft wood crossbars set on four-ft centers.

The projection for main and butt entries uses an 80-ft block system of mining. Butt entries are driven to their limit, which is approximately 2000 ft. From this point pillaring is started and mining done on full retreat.

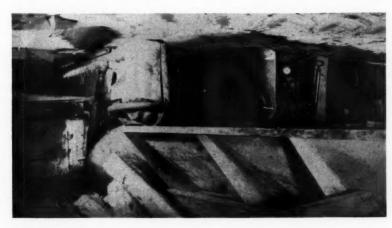
Equipment in each butt entry consists of two continuous mining machines and four shuttle cars, one unit working on each side of the

with the Joy machine by taking vertical lifts 30 in. wide and 18 in. deep. The maximum height is 60 in. and the minimum is 38 in.

Both 6 SC and 32-E shuttle cars are utilized. Dual wheels were installed on the 32-E to negotiate steep grades.

A straight fracture line is maintained in retreating each butt entry. When retreating, a place is driven in the center of the blocks from the belt entry to a distance of approximately 320 ft. The remaining 24 by 64 ft blocks are mined out consistently by taking lifts in proper sequence as shown on the map.

The Colver operation is equipped with 15 continuous mining machines. The Z section has a total of five miles of belt to transport coal from shuttle car loading points to the cleaning plant on the tipple. The F mine is equipped with four miles of main entry conveyors which discharge into eight-ton mine cars that are hauled two miles to the tipple. Main line track is provided from the tipple and portals up to each butt entry for man trips and the handling of supplies and equipment in and out of This track parallels the the mine. main line butt entry conveyor belts.



A 6 SC shuttle car at the Sonman operation loads onto a belt loader which in turn discharges onto a 30-in. butt entry belt

# The Practicability of

# **Present Day Plant Automation**

By CARLTON M. MARQUARDT

President Industrial Physics and Electronics Co. Most of the instruments or "hardware" for a high degree of metallurgical plant automation have been developed. What is needed most are trained control engineers who can apply the principles of control engineering

THE subject of metallurgical plant automation is a most timely and

important one. In these days of depressed metal prices, coupled with the highest wage rate the industry has ever had, we must take a look at the practical application of automatic control. At a time

N N

when other industries are applying every conceivable amount of control engineering techniques, why has our industry lagged so badly?

There are some facts which we must honestly face. The recent and extended period of high-priced metals has been a considerable deterrent to the application of control engineering techniques. During this period of high prices and high activity, there has been an extreme reluctance on the part of management to disturb the status quo in the labor field. This viewpoint is rapidly changing.

The second deterrent to the application of control engineering techniques has been ignorance of the field of control engineering. This ignorance has extended through all levels in the technical, production, and management fields. There have been extremely few concerns sufficiently interested in the field to employ fulltime, adequately trained control engineers.

When the author entered the field of control engineering, something less than fifteen years ago, to the best of his knowledge, he was the only person in all of this country who was devoting his full time to learning something about control engineering. This is now changing, but not at a sufficiently rapid rate.

#### Process Control Differs from "Industrial Gadgetry"

What is control engineering? The term "control engineering" seems preferable to the nasty term "automation", for control engineering is

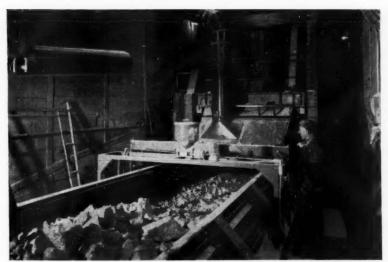
just what it implies. Control engineering immediately divides itself into two broad classes of application.

First, there is the problem of process control, wherein the process is adjusted to obtain a better economic result. In this field we would put the control of pH, pulp-densities, grinding circuits, etc.

Very different from this field of application of control engineering is the other broad category which, for want of a better term, shall be called "industrial gadgetry." This is an enormous field of application. America runs on gadgetry! If you don't believe it, take a look at your own



Control engineering can be divided into two broad classifications: process control and "industrial gadgetry." Shown here is an example of process control—a coal blending control system at the Geneva works of U. S. Steel Corp. in Utah



In many situations it is not necessary to invent anything. All that is necessary is adequate know-how to select the proper instruments. Pictured is a tramp iron detection unit at The Anaconda Co. in Butte, Mont.

home. The application of industrial gadgetry can save enormous amounts of labor. It can also save and simplify capital equipment. Some examples of industrial gadgetry are automatic pumping control systems, bin level indicators and controllers, industrial communication systems which speed the flow of information from one part of the plant to another, and industrial television which can be employed so that one man may watch several parts of the process.

In the application of control engineering, these two broad fields are often so closely interwoven that it is impossible to separate them. A process controller is made to work because a gadget operates satisfactorily and vice versa. Hence, the need for trained control engineers.

Let us return to the subject of process control because it is here that we will determine whether the application of control engineering on a broad scale is practical or not.

It has been observed over the years that we feel we have an industry which has unique problems that no other industry could possibly have—or so we tell ourselves. Hanging to this thought has been a terrible deterrent to progress.

In process control there are three main elements to consider. First, there must be a measuring device to measure whatever parameter it is that we wish to use for the purposes of control. In control engineering, this measuring device, whatever it may be, is called a transducer. The second device that is needed is the final process controller. This is the instrument that takes the intelligence from the transducer and through its

inward manipulations, produces a final control signal that adjusts the final control element. The third device is the final control element which may be a valve, a gate, a feeder, or what have you.

Any process, and we do not care what process it is, has certain natural characteristics that are inherent to the process. It makes no difference whether it is a petroleum refinery, pumping system, or a milling plant. These characteristics are always there. The principle characteristics that a process can exhibit are called lags. A process may exhibit transportation lags, capacity lags, or transfer lags.

Transportation lags are the lags that occur in transporting the product from one part of the process to another. Conveying systems are good examples of systems with a transportation lag.

Capacity lags are those lags which the system can "soak up" for a period of time, thus resisting a change in control. Consequently, capacity lags may result in a prolonged upset in the system once the change has taken place. Good examples of parts of processes with capacity lag are large classifiers, ball mills and thickeners.

Transfer lags are those lags which require the transfer in the process from one form to another. A good example of transfer lag is the conditioning time required ahead of flotation, which manifests itself more in flotation processes where two products are being made.

That these process lags exist and that they are common to every process, we can lay to rest right here. They are there; we must live with them!

#### Methods of Control Outlined

Instruments are built by numerous concerns to compensate for these process lags. Having these lags, it can be shown mathematically (and everyone has experienced it in practice) that a large milling circuit can be made to oscillate in accordance with the same exact laws as are applied to electrical oscillatory systems. The only difference is that this process is not called oscillating; it is called "hunting". Since we can control other oscillatory systems or hunting systems, we should be able to apply instruments to control them in our industry.

The three principal functions that modern process instruments have for the control of hunting are: (1) proportional band, (2) manual or automatic reset action, and (3) rate control.

Any newly installed system must be given a fair trial which includes "nursing" it through its early days of operation. The product recovery panel at Homestake-New Mexico Partners' mill in Grants, N. M., is shown here.



Proportional control is what it says. When the process varies by a certain percentage, the proportional control reverses the action by a pre-determined proportional rate. There aren't too many places where proportional control alone is employed. An example of the application of proportional control alone would be the simple case where, when the level falls by, say ten percent in a tank, valves are opened by ten percent which bring the tank up to the desired level. In theory it's fine, but ninety percent of the time it doesn't work by itself, for changing the position of the valve is no guarantee that the flow will change by that amount. The line pressure can vary, or dirt can get in the valve, and control action is defeated.

Therefore, to control the level in this tank, generally something more is needed. This something more is called automatic reset action. The controller now has variable proportional band plus automatic reset action. When the level in the tank drops, proportional action will cause the valve to open immediately and proportionally by a predetermined amount, but this may be too little or too much. Then reset action continues to slowly change the valve until the level has returned to normal, and when it has, further valve motion ceases. The amount of proportional action and reset action must be adjusted to obtain a control system that does not hunt. In the bulk of the control jobs, these two control actions are all that are necessary.

However, there are times when rate action is required. Such an application was a control system in which Industrial Physics and Electronics Co. was attempting to control the level in a sump which had only 31/2 sec of capacity by by-passing a portion of the pulp back into the sump from a point that was 12 sec away in transportion time. If the sump level tended to go down, a change made at a point 12 sec away wouldn't manifest itself at the sump because of the transportation-lag time. Quite obviously, the sump was subject to overflowing or to being pumped dry-two conditions that had to be avoided. Therefore, to stabilize control in this application it was necessary to view the rate of change of the sump level through the application of rate action. Thus, there was employed proportional action, reset action, and rate action. The system operated satisfactorily.

### Experience Required in Selection of

We see that instruments are available for almost any type of control problem that exists in the industry. To those who say that proper instru-

ments have not been developed, there is only one reply, "unadulterated hogwash."

In the field of transducers and primary measuring elements, there is an enormous number of elements available for application to our problems. The basic problem is largely one of selecting the most practical element to use. Industry experience here is of the essence.

One of the problems in connection with transducers and primary measuring elements is that of inexperienced and sales-conscious instrument salesmen attempting to apply wholly inadequate primary elements. An improperly applied or designed primary measuring element will generally do a poor job of control. Much experience and great care is required here.

Generally speaking, in the milling industry the problem of control is usually several problems which, when viewed by the control engineer, becomes a control system. The whole problem must be attacked. Perhaps one of the best places to start an integrated control system is in the grinding and classification circuits. The amount of misapplication in this field has been great. In most milling applications, what is desired is to obtain the maximum ore throughput in the grinding and classification circuit while at the same time the desired optimum grind is obtained. In most flotation plants, grinding is the largest single item of expense. Therefore, it behooves us to get the most from the equipment at all times.

Let us consider a standard ball mill-classifier grinding circuit. In most applications the maintenance of a constant circulating load in the classifier grinding circuit and the maintenance of a constant specific gravity of overflow of the classifier will assure optimum operating conditions. The power input to the rakes of a classifier motor is a good measure of the circulating load in the system. A simple pulp density controller operating a dilution valve in the ball mill discharge will maintain constant specific gravity of overflow.

By means of a simple transducer, the power input to the classifier rake motor may be converted into a standard three to 15 PSI instrument signal. This signal may be taken to a standard process controller associated with a simple pneumatic belt scale which will control the feed to the ball mill, thereby maintaining a constant circulating load at all times. The control instrument is provided with a ratio setting device together with a zero shifting device to allow for almost any conceivable combination that may be desired.

Notice that the signal representing power input to the classifier rakes controls the control index or setpoint of the scales. The scale has its own controller with whatever control action is necessary to force the delivery of the tonnage demanded.

But this is not enough for an integrated system of control, for usually it is desirable to operate the ball mill with a constant ball-mill dilution. Therefore, the instantaneous weight signal from the scales is in turn used to position the control index of a flow meter so as to ratio new ore-to-water to obtain constant ball mill dilution.

There is the solution to a problem in which it was not necessary to invent anything. All that is necessary is adequate know-how to select the proper instruments to accomplish this result. Maybe your problem is more complex. Maybe a simple ratio device will not suffice. Maybe one of the control parameters that you must use varies as the square root, the square, or some other function. Simple computing devices to accomplish these results are available for assembly into process systems.

A well-trained control engineer will analyze the situation and formulate a solution. Very often the formulation of a problem is more important than its solution. Having formulated the problem, he will then draw upon his knowledge to select the necessary "hardware" to construct the system.

## System Must Be Given a Fair and Adequate Trial

The installed system will have to be nursed through its infancy, and the operating personnel educated in its proper use. Often, this is a very trying period to the control engineer. He must be the doctor to his infant system, and he must be a first-order diplomat in dealing with the operating personnel. Far too often managements lose sight of this and far too often the control engineer is not sufficiently diplomatic. Many an otherwise good system has failed for these reasons.

Sometimes an otherwise good control system will fail because the final control element is not adequate. A case in point, occurred at a mill where an attempt was made to control the amount of lime added to the circuit. A home-made lime feeding system was tried first. The system proved to have nowhere near the degree of precision required. The local feeders had to be discarded. Next, the application of standard control valves was tried for control. Valves with stainless ports and trim were tried and proved inadequate; they would not stand the abrasion. Rubber-lined, Saunders-type throttling valves were tried but they, too, were cut out by the lime slurry in a very few days. A variable speed diaphragm pump was considered but rejected because of the

(Continued on page 86)

# Selection of A-C Distribution Equipment

The author points out some of the features that should be considered in selecting equipment for a mine's power distribution system, from the surface drill hole up to and including the junction box and trailing

THE lifeline of any coal mine to-day is it's electrical distribution system.

Manufacturers are compelled and have produced cables, switch gear, junction boxes, transformers, special connectors, and trailing cables to give maximum life expectancy with an absolute minimum of down time. When a failure does occur, construction must be such that repairs can be made safely and with a minimum

One of the problems confronting the coal industry in attempting to utilize some of the new equipment that is available today is the fact that many states are faced with the problem of being limited by statutory regulations based on experience with direct current, particularly as to voltage. To assure that the necessary amendments to existing regulations are based on sound thinking, an analysis of the various safety and economic features is certainly considered to be in order.

#### Survey of State Laws

In 1952, an analysis of the state laws of 18 states showed that:

- 1. Six states limit voltage on trolley wires or on portable equipment from 240 to 300 volts.

  2. Four states allow voltages higher than 300 volts for either portable equipment or trolley wires.

  3. Eight states make no statement regarding voltage.

While in 1957 a survey of the state laws of 26 states revealed the following information:

- Fifteen states have no limit on voltages used underground.
   Eight states limit trolley voltage from 250 to 325 volts on new
- rrom 200 to 325 voits on new installations.

  Three of the eight states in item 2 permit 550 to 650 volts on existing installations and three permit 550 to 650 volts on old or new trolley wire installations.

#### By JOHN A. STACHURA

General Superintendent Enoco Collieries, Inc.

- 4. A-C voltages for mobile equipment permitted in states as follows: a. one state permits 240 volts on new installations
  - b. one state permits 260 volts limit
  - except by approval c. one state permits 460 volts by approval
  - d. one state permits 480 volts limit e. one state permits 550 volts f. two states permit 600 volts

g. three states permit 650 volts In addition, one state places a limit of 5000 volts between conductors and ground for transmission; (one, 4000 volts limit unless by approval.)

Four states in this group (items e, and g) indicate that voltages higher than 550-650 volts may be used for transmission underground.

The numerous safety and economical features included in todays 440 volt a-c face set up and 4160 or 6900 volt primary voltage is a challenge to all states which prohibit or restrict its use by obsolete state laws.

Experience of Enoco Collieries, Inc., with a-c equipment has definitely proven that there are advantages with respect to lower initial cost, less maintenance, greater flexibility, increased efficiency, and improved safety to all personnel.

#### A-C High Voltage Lines

The primary distribution system in a-c mining would be similar to that for a d-c system except that the primary power lines would be carried closer to the working section permitting greater safety, convenience and economy.

In all instances voltage, load installation conditions, and cost are limiting factors in choice of conductors or cable design.

In the past nine years, Enoco has installed two types of high voltage transmission lines. One is steel armor lead sheath, while the other is neoprene type G shielded cable. Both are 5000 volt 4/0, three-conductor. The neoprene type G shielded cable has proven far more satisfactory for high voltage transmission underground.

Neoprene insulated cable offers the following advantages:

- Lighter and easier handling
- Lighter and easier handling Simpler splicing and terminating Greater flexibility for installing Potheads are often unnecessary Replacement of lead by neoprene eliminates electrolytic or chemical corrosion, fatigue, and reduces mechanical damage
- 6. Moisture does not affect the insulation

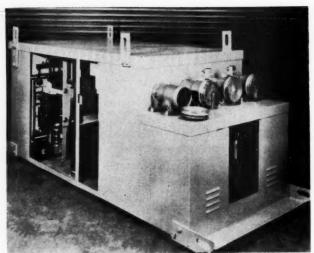
The old armored cables with lead sheath and steel wire armor provided good mechanical protection but poor protection against electrolysis and corrosion. Failures internally are difficult to locate and repair extremely difficult. To reclaim or move the armored cable is a major project and would restrict the advancement of a-c systems if required by mine

Installation of high voltage lines

John A. Stachura began his mining career at the Harwick Mine of Duquesne Light Co. in rising to g in 1930, general



assistant foreman. In 1941 he was trans-ferred to the com-pany's Warwick mine, pany's Warwick mine, serving successively as safety engineer and assistant superintendent. Employed by the Pennsylvania Department of Mines in January 1949, he served as State mine inspector for ten months. Since October 1949 he has been general superintendent, Enoco mine, Enoco Collieries, Inc.



Because there are no cooling liquids to add weight to this transformer, it is easily moved and installed

has been further simplified with the introduction of plug type connectors. As a result the high voltage lines can be made up in sections and installed quickly and safely. These cables are connected to high voltage junction boxes which provide branch circuits, as well as through circuits to the next branch circuit point.

Branch circuits, as well as the through circuits can be equipped with plug type connectors.

The junction boxes are mounted in such a way that they can be readily moved from one location to another.

#### Secondary and Trailing Cables

Voltage and load again are limiting factors in choice of conductors size and cable construction for secondary and trailing cables. In the secondary cable system the one real important item is the selection of the best available quick connector so that cable can be added or taken out with a mini-

mum of lost time, thereby permitting operation with shortest possible length of cable until an extension is needed.

Enoco has tried quick connectors in trailing cables on continuous mining machines, but this did not prove to be a good practice.

Trailing cables for all face equipment except shuttle cars has been perfected to give maximum safety and efficiency with a minimum of lost time. In recent months manufacturers have designed and are now experimenting with trailing cables for shuttle cars which will greatly reduce trailing cable problems with ac shuttle car haulage.

The problem of locating cable faults on all a-c face equipment occasionally results in increased down time because the fault does not show up as clearly as it does on a d-c trailing cable. The usual procedure of visual checking or use of a test light frequently results in added lost time

and additional cable damage.

This can best be remedied by the use of some type of fault finder which can greatly reduce the time required to locate the cable fault.

#### Transformers

The introduction of Westinghouse 300-kva dry-type introgen-filled transformer was an important step forward in simplifying the problem of maintaining good face voltage. Enoco had the first 300-kva dry type for underground use. The unit is 3 ft high, 5 ft wide anl 10 ft lon. Its total weight is 7000 lb. Primary voltage is 2400 delta and the secondary is 480 volts wye. The transformer is equipped with a 5 percent tap below 2400 volts.

Units are skid-mounted and have quick means of connecting and disconnecting primary and secondary feeders with plug and receptacle type entrances. Because there are no cooling liquids to add weight to these transformers, they are easily moved and installed. Safety features of this unit are superior to d-c conversion equipment and maintenance is reduced to a minimum as the transformers are hermetically sealed against dust, dampness and explosive gases.

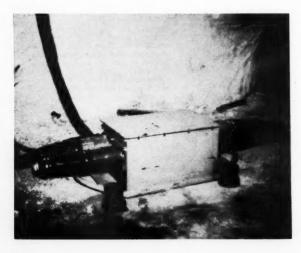
Attached to the transformer is a safety circuit center of permissible type containing two outlets, each with a 600-amp circuit breaker, 600 to 2000-amp trip, a ground fault detector and an under-voltage intrinsically safe control with a 0.25 second time delay.

Another transformer is a ventilated-type power center, a standard package unit with four secondary breakers plus the breaker for lighting.

The modern construction of underground transformers permits maximum safety and efficiency with primary hooked in as delta or Y-connections, thus permitting delta or Y on the secondary side. This appears to be a matter of choice since the incorporation of the zig-zag transformer to eliminate the hazards of the ungrounded delta system which was common with the use of old type transformers.

Another important unit which has played a big part in expanding the use of a-c power underground is the improved permissible junction box. This unit permits the segregation of the face load into different circuits with each load circuit under the control of its individual circuit breaker and ground fault detector, and with individual machine protection, as well as extra protection to the operating personnel. Units are sturdy yet light in weight, skid mounted, and are equipped with quick connectors

(Continued on page 86)



Improved permissible junction boxes have played a big part in expanding the use of a-c power underground

63



How a little
give adds a lot
of life to...
AMSCO
CRUSHER
PARTS

Concave ring and mantle of this Hydrocone crusher are made of the toughest steel known... Amsco Manganese Steel. It gives a little, to take more punishment. Hydrocone is a registered trade-mark of the Allis-Chalmers Manufacturing Company.

Both mantle and concave ring crush a lot more feed because of certain properties of Amsco® Manganese Steel. The metal gives a little under crushing forces, absorbs stresses, resists cracking and chipping. Yet these same forces workharden the surface of Amsco Manganese Steel to as much as 500 Brinell...a high hardness, stubborn to wear.

Amsco Manganese Steel Crusher Parts main-

tain their ductile undersurface and workhardened surface even when worn thin. That's why Amsco parts endure severe abuse for so many work hours without letup.

To be sure of getting Amsco Manganese Steel, order replacement parts from your crusher manufacturer. Amsco makes manganese steel parts for most manufacturers of crushing, grinding and pulverizing equipment.

Amsco also produces other alloy steels with maximum wear resistance under particular service conditions



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OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS, JOLIETTE, QUEBEC

A SMALL nuclear device of 1700 tons equivalent high explosive energy release was detonated at the end of a drift under a mountain in Nevada. This explosion, known as the Rainier event, took place on September 19, 1957.

#### Radioactivity Confined to Small Underground Area

The purpose of the test was to develop a weapons testing technique that would permit firing under any weather conditions, and would restrict radioactive contamination to small areas on the test site. The experiment was completely successful and no detectable radio activity from the explosion escaped to surface. Detailed study of the effects produced in the medium surrounding the explosion have yielded results that have added impetus to the Plowshare Program of the University of California Radiation Laboratory at Livermore. Plowshare is a project sponsored by the Atomic Energy Commission to study the feasibility of using nuclear and thermonuclear explosions for peaceful applications. This article and the following article by David D. Rabb describe the phenomenology of the explosion and suggest some possible applications.

The Rainier device was detonated at a depth of 900 ft in a small room, six by six by seven ft, located in a thick deposit of tuff. The tuff in situ had a density of 1.9 to 2.0, a porosity of 30 percent, and was saturated with water. Thus the medium contained 20 percent water by weight. The tunnel was terminated in a spiral designed to be self-sealing.

On detonation, the room was expanded to a roughly spherical shape having a radius of 55 ft. (See figure 1.) The cavity was lined with a layer of melted rock at a temperature of 1200 to 1500°C which amounted to 700 tons. At this radius the layer was then four in. thick. The melted rock, being highly fluid, dripped from the ceiling and flowed down the sides of the cavity. At this time, the cavity was filled with steam at a pressure of about 40 atmospheres. about a minute the pressure was re-lieved by failure of the cavity and the melted rock was quenched to form a glass. The roof collapsed and caving proceeded progressively up to a height of about 400 ft above the point of detonation. Beyond the 55-ft radius the shock crushed the medium to a radius of about 130 ft. At greater distances the effects were quite small. The tunnel collapsed at a radius of 200 ft from zero site. Heavy spalling of the tunnel walls occurred to a radius of about 400 ft, but beyond that only occasional light falls were observed. The ground shock was not felt by observers beyond 2.5 mi. At that position the acceleration was .01 g.

# NUCLEAR EXPLOSIONS

An explosion of a small nuclear device under a mountain in Nevada was an event which could have far-reaching consequences for the mining industry

# The Rainier Test



By GERALD W. JOHNSON

University of California Radiation Laboratory

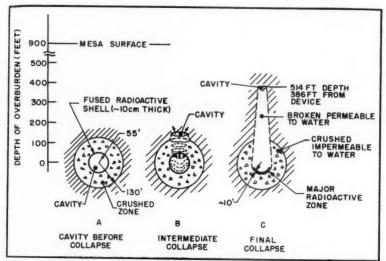


Fig. 1. Three phases of formation and collapse of initial cavity

#### Results of Test Summarized

The results of the experiment of interest to peaceful applications may now be summarized.

1. The radioactivity, with negligible exceptions, was all trapped in the 700 tons of melted rock. When the cavity collapsed this material fell to the bottom of the cavity. Experiments with this material have shown that the radioactive material is in fine solution in the

glass and is unavailable for ground water contamination. Indeed, to get it into solution at all requires pulverization and treatment with concentrated acids. 2. The region produced by collapse of the cavity, comprising some 200,000 tons, is highly recomplising.

2. The region produced by collapse of the cavity, comprising some 200,000 tons, is highly permeable to water and is not contaminated by radioactive debris. 3. The crushed region produced by the

3. The crushed region produced by the shock, is very much less permeable—in this material the return of water used for exploratory drilling was complete. In

(Continued on page 80)

# Possible Mining **Applications**

By DAVID D. RABB

University of California Radiation Laboratory

control of the blast can be easily attained, seismic effects are relatively minor, and the actual mining of the radioactive blast products and isotopes appears feasible. Also, ways and means have now been devised to give directional effects from such a blast. For example, to obtain maximum shock transmission, there is an optimum distance for a particular device to be placed in relation to the rock walls surrounding it. If the device is too far away, or too close, less effect is transmitted to the rock. Another possible but as yet unproven effect is that of a shaped-cavity. If the device were exploded underground in a room of a certain configuration we might expect a concentration of the results in one certain direction.

In addition to these facts, it is now believed that energy from a nuclear explosion can be distributed underground in two directions along a tunnel, or in four directions along two intersecting drifts of limited length, or even equally throughout a large (Continued on next page)

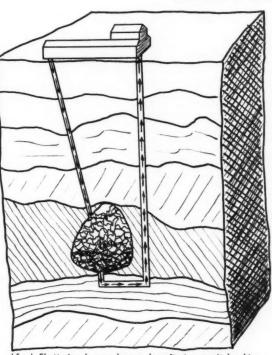
#### POSSIBLE APPLICATIONS INCLUDE



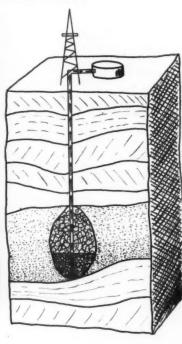
THE results of the Rainier shot demonstrated novel and interesting possibilities for the application of nuclear energy to the ex-ploitation of mineral deposits. Such devices might make it possible to extract ores that now are marginal, because this recently discovered source of energy offers possibilities of breaking rock with an economy and magnitude never before possible in the mining industry.

#### **Encouraging Results** Point to Possible Uses

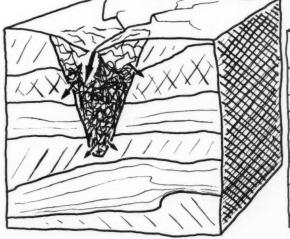
The author wants to first emphasize that nuclear energy can be used underground without releasing a detectable amount of radioactivity to the atmosphere; and second, the possibility of ground water contamination appears remote. Adequate

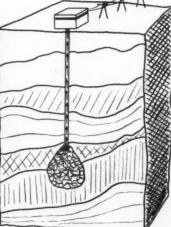


(fop) Shattering low-grade ore deposits to permit leaching in place. (Bottom) Breaking large volumes of rock to the surface to provide underground storage for water and to aid in flood control



(Top) Heating oil bearing sands to produce oil reservoirs. (Bottom) Producing heat for power generation





#### RABB (Continued)

flat cylinder—thereby making it possible to direct the force of an explosion over a certain desired area. In other words, the results need not always be spherical.

Suggested applications of nuclear power to mining and allied industries include, but are not limited to:

- 1. Removal of overburden or waste material from underlying, commercially valuable ore: Such stripping operations are common practice, world-wide, particularly in coal and iron mining and in the large, low-grade copper deposits of Chile and the Southwest United States. This application seems most reasonable in a relatively remote unpopulated area.
- 2. Massive crushing or breaking up of large ore bodies preparatory to drawing off the crushed ore by stoping or mining from below (similar to standard block-caving mining procedure): Most of the rock breakage in an underground nuclear blast occurs when the cavity formed by the explosion collapses. The back comes down with subsequent caving and breaking proceeding progressively upward. Such fracturing of large, low-grade ore bodies might also be accomplished prior to implace leaching in a manner similar to that practiced in some copper mining regions to glean the final traces of valuable minerals from caved-in, brecciated areas that are impractical to work or too low-grade to warrant a full-scale mining operation. In fact, it is believed that the compaction and fusion of the rock surrounding a nuclear blast will tend to retain water or pregnant liquor in the basin-like lower portion of the original blast area.
- 3. The intense shock plus the heat and pressure provided by an atomic or nuclear device could be used to promote recovery of petroleum products from tar sands, oil shales, depleted or heavy oil fields, and gasbearing strata.
- 4. In many of the more arid areas, an underground eistern might be formed to help reduce seasonal flood

waters, to replenish ground-water tables and/or to create reservoirs of available water. With one nuclear explosion properly placed so as to just break to the surface, a large rubble-filled porous catch basin could be created to trap surface water. In other areas it might be possible to tap a water-bearing aquifer and establish a source of ground water.

- 5. The application of nuclear power to quarrying and the production of fill or rip-rap is a natural and logical application. There are many places in North America where mountains could be moved to make very large quantities of fill with one blast. Also, there are possibilities for excavation of harbors, the digging of canals and the removal of navigational hazards.
- 6. In a nuclear explosion, it is possible to produce a quantity of radio-isotopes much faster than in a pile. It appears that an underground explosion offers a feasible scheme of producing these isotopes in quantity. Therefore, a further consideration for mining men might be methods of recovery of these valuable isotopes plus the unexpended fissle material. Special mining techniques will be required to reclaim the irradiated material and radioactive debris from a nuclear blast area.
- Some day, particularly if the current nuclear experiment "GNOME" near Carlsbad, New Mex., is successful, we may be mining for power. A large nuclear shot deep underground can create a reservoir of heat which is accessible to produce power in a number of ways. There may be steam generated by water introduced into the explosion area or the heat may be recovered by some appropriate heat-transfer medium such as perchlorethelene or gaseous CO<sub>2</sub>. Also, it seems feasible to transfer steam produced in the area of the subterranean nuclear explosion in, beneath or near tar sands or oil shales and thereby aid the recovery of the petroleum product. The use of steam for heating an oil bearing formation would distribute the heat more uniformly and spread the temperature profiles farther and faster.

#### Test GNOME To Be Evaluated from Mining Viewpoint

In future tests being considered, the Laboratory will continue the studies initiated for the Rainier event on seismology, rock mechanics and physical properties of rock, and will continue to evaluate the mining applications. The GNOME operation, if conducted, will be assessed from the standpoint of application to the mining industry and potential mining methods. A study of underground nuclear blasts is considered to be of tremendous importance to the future of the mining industry and to the United States. As more is learned from these tests and studies and as more industrial groups become aware of the potentialities, many other practical useful applications to mining and industry as a whole will become apparent.

Remember—this program is in its initial stage. It is largely in the idea phase, and currently there is little technical data assembled on the use of nuclear explosives for such purposes. However, there is a wealth of ideas, and information is gradually being compiled.

The University of California Radiation Laboratory welcomes constructive proposals and suggestions from industry and its scientists and engineers. Such ideas, or requests for information currently available, may be addressed to the San Francisco Operations Office, U. S. Atomic Energy Commission, 518 - 17th Street, Oakland 12, Calif., Attention: Plowshare Program. Information, as it is assembled and published, will be made available to those companies and research institutions having an interest in the program. Most assuredly we are interested in your reactions.

#### JOHNSON (Continued)

addition, gaseous radioactive fission products did not penetrate into this region during or after the explosion.

4. More than one-half the total energy

4. More than one-half the total energy release of the bomb (1700 tons = 1.7 X 10<sup>12</sup> calories) was initially at high temperature (above 200°C). Because of the presence of large quantities of water and the high permeability of the central region, the heat rapidly redistributed itself to the temperature of boiling water.

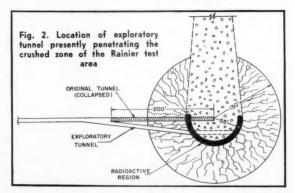
5. The seismic ground shock was not felt beyond a distance of 2.5 mi. Electrical cabling and electronics recording systems housed in a light metal frame building at a distance of 2000 ft from the center of detonation were not damaged or affected in any way. These observations indicate the feasibility of using much larger detonations near fixed installations and inhabited areas without difficulty. However, much more experience will need to be acquired before specifying exact distances at which various kinds of facilities might be damaged.

#### Tunnel Being Driven Through Cavity

Presently a tunnel is being driven

through the Rainier cavity to provide information on the gross physical properties of the region near the center of detonation, and to gain experience in mining radioactive materials. The face of the radioactive sphere was reached about eight

months after detonation, and pieces of the broken radioactive debris were removed by hand. The radiation level right at the face was 300 milliroentgens per hr; three ft away it was 20 mr. The temperature of the working face was 40°C (104°-F), as expected from earlier exploration by core drilling. The fragments of glass were easily selected and removed, and can be handled using rather minimal radiological safety precautions. Simple shadow shielding using sand bags will reduce radiation levels to negligible amounts.



# BENEFITS OF REDUCING

# CIRCULATING SOLIDS

Amount and type of rejects because of full-seam mining . . . size of particle in the raw coal feed . . . need for a uniformly good quality metallurgical coal . . . the point at which most of the impurities will be liberated from the product-all are problems of the Vesta preparation plant and contribute to the water problem. Here is what happened when management set out to reduce the circulating solids load

#### By J. J. REILLY

Coal Preparation Superintendent Vesta-Shannopin Coal Division Jones & Laughlin Steel Corporation

ONTROL of solids in the circu-Clating water is a major problem confronting plant personnel where wet cleaning methods are being used. If the solids are allowed to build up, the entire circuit gets out of control, and the uniformity and quality of the product are adversely affected.

It is necessary, therefore, to:

It is necessary, therefore, to:

1. Determine the type of material causing the build-up, and to establish the necessary plant bleed.

2. Analyze the material to determine if it should be discarded and wasted, or recovered.

3. Determine if an attempt should be made to isolate it, treat it, and later combine the recovered material with the shipped product, or at least some percentage of it.

4. Locate the point in the water system where the undesirable material can be concentrated and eliminated.

5. Determine what percentage of the

can be concentrated and eliminated.
 Determine what percentage of the raw coal feed or what tonnage of the undesirable product must be wasted to give complete control.

This problem of control of the solids in the water system will vary from plant to plant due to seam conditions, methods of mining and type of equipment. The use to which the end product will be put will govern, to some degree, how extensive the control must be. Satisfactory products at all plants are not necessarily the same, so the operator must strive for maximum economic recovery based on what he can sell.

Economics, to a large degree, will dictate the mining methods ahead of the plant; however, it is an accepted fact that where it is economical to load the entire seam, full-seam methods will be employed. The introduction of and the growing use of continuous mining machines has added its share to the water problem, and while there is no question as to the economics of this type of mining, it is a generally accepted fact that the raw products supplied the preparation plants from this type of equipment will contain a higher percentage

### Problems Confronting Preparation

The Vesta Mines of the Jones & Laughlin Steel Corp. operate in the Pittsburgh seam in Washington County, Pa. This seam is overlain with a drawslate 12 to 16 in. in thickness, which slimes readily when wet. This fact alone is one reason why, later in the discussion of the water clarification problem, it will be seen that one of the 150-ft thickeners is used as a classifier overflowing a higher ash product than the settled

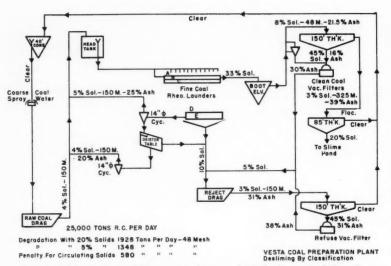
The amount and type of rejects because of full-seam mining, the size of the particle in the raw coal feed, the need for a uniformly good quality metallurgical coal, and the point at which most of the impurities will be liberated from the product are all problems of the Vesta preparation plant and contribute much to the water problem.

When the preparation plant was put into operation initially, the fine coal plant was not in service. Later, as the fine coal launders were put into operation and the tonnage fed to the launders reached the designed capacity, the solids in the circulating water continued to increase and attained a concentration of 30 percent. Under these conditions the tonnage of solids being circulated in the fine coal processing water was 750 tons, and was greater than the 700 tph being processed as ¼ in. by 0 raw coal feed to the launders.

#### Evolution of the Vesta Water Circuit

Under a condition such as this, with a high solids content, all cleaning efficiency was destroyed. Laboratory analysis had established this build-up size as minus 14 micron and a highash clay; therefore, it became necessary to provide some method for the removal of this minus 14-micron material. Plant personnel set out to pump to waste an amount equal to two percent of the raw coal feed, which amounted to from 400 to 600 tons per day. This reduced the solids in the circulating water to 20 percent.

Because the material now being wasted contained some plus 325-mesh material and the ash content was 32 percent, management endeavored to minimize the amount of low ash material being wasted. Ten 14-in. cyclones were installed to classify the overflow of three boots. The underflow from the ten 14-in. cyclones was fed directly to the vacuum filters and introduced in such a manner that



Present desliming circuit. Management places much emphasis on circulation of a minimum amount of water and has made an effort to reduce the solids in the water to the lowest possible concentration

this coarse material was picked up first by the sectors. The overflow of the cyclones was combined with the overflow from the fourth boot and was fed to the 150-ft thickeners.

This change affected the water system in several ways: A bed of coarse material was picked up by the filter sectors first, thus entrapping more minus 325-mesh material; the thickeners were also classifying at a finer size; the circulating water solids was reduced to 14 percent, and the waste pumping was reduced to 200 tons per day.

Continuing to try for maximum recovery, two additional filters were installed, making a total of six units filtering the underflow of the two the waste pumping to 100 tons of solids per day. posal of a minus 48-mesh refuse.

Analysis of the 150-ft thickeners overflow demonstrated that these thickeners were acting as classifiers,

150-ft thickeners. This step reduced The additional recovery, however, increased the moisture of the metallurgical coal, and it became necessary to plan the removal of the fine clay and the dis-

30% 20 % SOLIDS-RECIRCULATING WATER 15 CYCLONES & FILTERS 10 FLOCCULATION 5 %-48 MESH-RAW COAL REFUSE FILTERS % RAW COAL PUMPED TO WASTE 39% ASH 32% ASH % MOISTURE IN PRODUCT IMPROVEMENT IN % ASH IN PRODUCT 57

A graph of the evolution of the Vesta water circuit showing the benefits of reducing circulating solids

with the fine clay, high ash material staying in suspension and not settling. Analysis further demonstrated the fact that the highest concentration of fine, high ash clay occurred in the water system at this point.

To try to eliminate this undesirable material, as much of the overflow of the 150-ft thickeners as could successfully be handled was introduced to an 85-ft thickener, and with the use of a flocculant the 85-ft thickener then became a clarifier. The underflow of the 85-ft thickener containing 90 percent minus 325-mesh material and 39 percent ash was wasted by pumping. The overflow from this thickener was clear.

It should also be mentioned that the use of the flocculant in the thickener permitted reducing the volume of water being pumped containing waste solids. In the course of experimentation management found it to be more economical to treat water containing less than six percent solids, but at the same time found it to be true that the classifiers were more efficient with the lower percentage of solids.

With the plant's present equipment it is felt that the maximum economical amount of fine coal is being recovered. If any additional tonnage were recovered and placed in the product, it would raise the moisture beyond the acceptable specification.

With the isolation of fine solids, plant personnel have now increased the ash in the waste pumping to 39 percent, and, with the reduction of solids in the circulating water, have been able to avoid an increase in wasted tonnage.

During 1957 the minus 48-mesh material in the raw coal feed increased to 5.8 percent. The metallurgical moisture again exceeded the quality limits, and in order to produce a coal with a satisfactory moisture content, it became necessary to reduce the minus 325-mesh recovery and increase the waste pumping to 2.5 percent of the raw coal feed. Due to limited pond area, two vacuum filters were removed from the clean coal circuit and installed in a location in the plant where the refuse thickener underflow could be filtered

With 26 years of experience in coal preparation, J. J. Reilly is well qualified to discuss solids con-trol and its various



ramifications. From 1932 to 1942 he served as foreman of served as foreman of the coal preparation plant of Clairton Coke & Chemical Works, U. S. Steel Corp., and from 1942 to 1947 as general foreman of the prep-aration plant of Pitts-ts Coke Works, Jones Corp. Since 1948 he

burgh By-Products Coke Works, Jones & Laughlin Steel Corp. Since 1948 he has been superintendent of J & L's Vesta-Shannopin Coal Division's plant.

and discharged to the refuse conveyor. This reduced the waste pumping, dividing the waste material—part being conveyed and part being pumped.

The accompanying chart indicates the decrease in solids, the percentage of minus 48 mesh in the feed, and the effect of the waste pumping on the moisture and ash of the product.

Management has, at the Jones & Laughlin preparation plant, complied with the Clean Streams Act—the effluent from the sludge pond returning to the river being water white.

The material the plant is wasting would be very difficult to clean; however, our research people are at present working with the coal division laboratory personnel to try to find a satisfactory economical method.

#### Present Desliming Circuit

At the present time management's problem is to remove enough fine slimes from the 3,500,000 gal of water in the Vesta plant's system to maintain the balance.

After dry screening and blending, the 1/4 in. by 0 in. raw coal is conveyed to four Rheolaveur launders. The clean coal and water pass over A, B, and C launders to the boots and dewatering elevators, where the plus 48-mesh is removed and conveyed to the centrifugal driers. Here the desliming by classification starts, as the minus 48-mesh overflow has an ash content of 21.50 percent. These solids are sluiced to a 150-ft thickener, which also acts as a classifier, thus reducing the eight percent solids in the feed to three percent in the overflow. This overflow material is 39 percent ash, and is 90 percent minus 325 mesh in size, and is being flocculated and pumped to the slime disposal pond from the 85-ft thick-

The overflow from the D and E launders, which normally in a Rheolaveur circuit is recirculated, is de-

The economics at each plant must be studied to determine the method that can best be used to obtain maximum recovery of useable coal at the lowest possible cost



watered with a 14-in. cyclones for Deister table feed. After the Deister table cleaning, the float coal joins the clean coal from the launders, while the sink joins the 1/4 in. by 0 refuse in the drag tank. The overflows from the cyclones and drag tank contain high ash, minus 150mesh clays, from three percent to five percent solids. The plus 150 mesh is removed from the drag tank with a drag conveyor. The overflow from the reject drag, containing high ash slime, is pumped to a 150-ft thickener. The settled solids from this thickener provide the feed for the two refuse vacuum filters, the cake being discharged to the refuse conveyor.

The overflow from the thickener clarifiers contains but a trace of solids, and this water is pumped to the constant head cone and used as processing water in the primary and secondary cleaning units. The water from the raw coal drag tank and cyclones is used as processing water in the fine coal launders and Deister tables.

In plant operation, management places much emphasis on circulation of a minimum gallonage of water, and has made an effort to reduce the solids in the water to a minimum. As the accompanying graph indicates, based on a plant feed of 25,000 tons of raw coal per day, the degradation, due to circulating water with a solids content of 20 percent, should amount to 1928 tons of minus 48-mesh material. By reducing this solids content to five percent, the tonnage of minus 48-mesh degradation would be reduced to 1348 tons. The penalty is 580 tons per day of increase necessary to be disposed of in the products.

The plant has flexibility in the arrangement for handling thickener underflows. Underflow from any of the three thickeners can be routed to any of the sumps, from which it can be pumped to:

- 1. The filters in the clean coal cir-
- 2. The filters in the refuse circuit
- 3. The waste disposal pond

#### Summary

The Vesta-Shannopin Coal Division of Jones & Laughlin Steel Corp., feels that solids control is necessary, and that the operator can minimize the problem of degradation by operating with a low percentage of solids in the circulating water, thus avoiding recirculation degradation.

Some of the benefits to be obtained by reducing the circulating solids are:

- A. A maximum quantity of coal can
- be processed.

  B. A more uniform and a better quality coal can be produced.

  A lower percentage of solids and
  - A lower percentage of solids and less tonnage in the thickeners make a better thickener operating condition, less settlement when the plant is shut down, and minimizes the variations in the amount of minus 48-mesh material in the product during the shift.
- C. Greater efficiency from the classifiers.
- D. Reduced cost of flocculation.
  E. Reduced cost of plant maintenance.
  F. Compliance with the Clean Streams
  Act.

The economics at each plant must be studied to determine the method that can best be used to obtain maximum recovery of useable coal at the lowest possible price.



Underflow from any of the three thickeners can be routed to 
any of the sumps, from which it can be 
pumped to the filters in the clean coal 
circuit, the filters in 
the refuse circuit or 
the waste disposal 
pond

# COAL

# HAULAGE



A Euclid 51-ton coal hauler is being loaded by an L-85 Lorain with a 31/2 yd coal bucket. The versatility of modern coal-hauling equipment has made it possible for Bruns Coal Co. to establish a profitable operation under "tough" conditions

Steep downgrades, heavy loads and hard winters are some of the problems this West Virginia coal operator faces. They are being answered with high capacity tractor-trailer units equipped with oil retarders, construction of good roads and the development of a streamlined accounting system that keeps management informed on its haulage costs

By ERNEST BRUNS

President Bruns Coal Co.

THE coal business couldn't get very far without some means of moving coal from the mines to the consumer. There are many ways of doing this; some are more suitable than others.



The economy of strip mining would be nearly impossible without off-highway haulers. The flexibility of large capacity trucks have, in part, made it possible to develop coal reserves that a short time ago were uneconomical.

This article will tell how the versatility of modern coal hauling equipment made it possible for Bruns Coal Co. to establish a profitable operation under tough conditions. The problem

at Bolt, W. Va., is characteristic of many strip mine operations in West Virginia and perhaps in other parts of the country too. Coal is at an elevation of 2600 ft, while the railroad or delivery point is down in the bottom of the valley. The mine is about 850 ft above the dump and in rough country.

#### Grade Averages 6.7 Percent

Ownership and topography made it necessary for Bruns to gain this 850 ft of elevation in 2½ miles, giving an average grade of 6.7 percent with pitches up to 7.5 and 9 percent. The grade was built in the same way that the company opens up a coal seam outcrop—drilling and blasting from a pioneer road ahead, followed by a 5-yd stripping shovel which side casts the material over the mountainside.

Dozers leveled out the spoil and dressed up the grade. The company tried to make the basic road bed at least 60 ft wide, allowing 6 to 8 ft each for ditchline and shoulder and 45 ft for running surface.

Road ballast consists of about 18 in, of minus 3-in. crushed rock. During the next operation season, management expects to place a 3 or 4-in. surface coat of %4-in. minus rock on top of the ballast. This will provide some material to blade and will be maintained with a slight crown for surface drainage,

In building roads, the company has always been convinced that low road maintenance costs are the result of just a little extra care in construction. Examples of this may be seen on the operation's main haul road. There you can see a dry masonry

headwall to protect a fill from washing, a pole placed across the creek to stop rocks and trash from entering the culvert, removal from the drainage of light debris that could, during freshets, be washed down to plug the culvert, and a culvert outlet riprapped with rock to prevent undercutting of the fill.

Total direct costs for building the mainline haul road averaged about \$64,000 per mile. Road costs, which include the coal dump and crusher installation costs, are being written off at the rate of four cents per ton of coal.

## Special Techniques Developed for Winter Operations

It has been the general feeling in the industry that the high capacity tractor-trailer unit of the type being used by Bruns could not be used on long, steep downgrade hauls such as was required at Bolt. This same type of haul is required to economically develop coal reserves in many other regions as well as in West Virginia. Bruns, too, had misgivings about the tractor-trailer haulage units.

Effectiveness of the oil retarder with which these haulers are equipped was an unknown quantity to Bruns. Also, the ability of drivers to safely steer the heavy units down slippery mud or frozen surfaced roads was a concern, and once down to the dump at the bottom of the grade, would the haulers have enough traction to get back up to the top? Management was enough concerned about these questions that when the first heavy snow came the company actually shut down operations.



If all braking devices were to fail, the truck could be stopped simply by dumping the load

It was progressively discovered that by putting tire chains on the drive wheels and using the NoSpin differential, the large vehicles could safely negotiate the grade in either direction in just about any kind of weather. Loaded, downgrade speeds average better than 20 mph on the main haul road. Coal haulers returning empty average between 15 and 16 mph.

During the winter of 1957-58, a winter in which Bolt had a total of 162 in. of snow, the company did not lose a single shift or suffer a single

accident because of any inability of off-highway coal haulers to handle the tough job. This speaks well for the adaptability of the high capacity 60-ton payload coal hauling vehicle to severe conditions.

#### Oil Retarder Proves Effective Brake

The oil retarder is, in effect, an inefficient centrifugal pump mounted right in the drive line. When oil is introduced into the pump it creates a frictional drag on the drive line, thus slowing down the vehicle. Frictional heat created in the oil by the pumping action is transferred, by means of a heat exchanger, to the radiator water which is cooled in the normal manner.

It took but one or two trips to convince Bruns that here was a highly effective brake able to control the truck within normal operating speed ranges. Perhaps the biggest feature of this auxiliary brake is the safety value of always having the regular shoe brakes for reserve. Another additional safety feature in braking is that if all braking devices were to fail the unit could be stopped simply by dumping the load.

### Deep Mine Operated in Conjunction with Strip Mine

An interesting sidelight in the Bruns operation is the deep mine operated in conjunction with the strip mine. Equipment consists of a Jeffrey Colmol working ahead of a Joy Extensible Belt conveyor system. Coal haulers are loaded under a direct delivery conveyor. This arrangement of equipment permits the company to recover a high percentage of the coal



Total direct costs for building the mainline haul road averaged about \$64,000 per mile. Road costs, which include the coal dump and the crusher installation costs, are being written off at the rate of four cents per ton of coal

beyond the limit of the stripping shovels. The Colmol is working in 48 in. of coal, cutting a swath ten ft wide. The company is equipped to drive 1200 ft in depth.

#### Management Needs Streamlined Accounting System

Returning to the subject of hauling coal, let us examine the cost phase of the operation. This is a difficult thing to discuss because each operator has a different way of keeping and showing costs. Some operators, on the one hand, instruct their ac-countants to tell them what they think management should know about the cost of hauling coal and then, on the other hand, instruct the accountants to include some costs of other mining functions that need help. In other words, there is no standardized method of record keeping within the industry that would give operators a "par for the course" cost of hauling coal.

A realistic appraisal of the cost of hauling coal must be one that is adequate to bring the costs from the working level through to accounting without distortion within each cost category and with sufficient speed to be usable to management. Gone are the days, even with small operators, when the balance sheet was a once or twice a year reckoning. Management in today's highly competitive market must have a streamlined accounting system that, at the very least, will tell him monthly where his dollars are going.

Bruns uses several forms to help keep track of its cost, tying down manhours, parts and supplies by equipment number, make, etc. The Operator's Daily Report is used by the truck operator to show production, time, additional fuel and oil added, and repairs required on his particular truck. On another form mechanics apportion their time according to the vehicle upon which they worked. Other forms include the Daily Parts Department form upon which parts and their value are assigned to each vehicle as they are issued out of parts stock and the Greasing Daily Report which shows the number of gallons of fuel, quarts of oil, pounds of grease, etc., that is used on each piece of machinery.

A large recap sheet, one for each piece of equipment, summarizes the information accumulated on the four forms. Final cost, as far as coal haulers are concerned, is represented as an hourly operating cost, the basis upon which Bruns chooses to compare vehicles. If the company were to represent its costs on the basis of a cost per ton mile for total ownership and operating costs, it would come up with a figure of about 5½ cents per ton mile.

Many companies also include super-

vision and road maintenance along with ownership and operating costs.

#### As Production Rises, Costs Go Down

In analyzing total hauling cost for a 12-month period in 1957 and 1958 when the haul averaged 5.8 miles, an interesting comparison was discovered between costs and monthly production. Generally speaking as production rises, costs go down. A rapid decrease of production during the winter months was reflected in a fast rise in costs, vividly pointing out the necessity of developing further techniques for winter operations that will keep production high and hauling costs down.

As hauls get longer the application of the high capacity off-highway coal hauler becomes still more important to the coal industry. The versatility of modern coal-hauling equipment available to Bruns Coal Co. has made it possible for the company to establish a profitable operation under abnormal conditions.

#### PRESENT DAY PLANT AUTOMATION

(Continued from page 74)

high first cost and inability to work with pressure on the intake. Finally, a time-modulated scheme was tried using a Red Jacket valve. The valve was operated on a completely open or completely closed basis with control being effected through the amount of time that the valve was operated. The valve was operated on a 10-second repeat cycle and could be opened or closed during any portion of the 10-second cycle. operation from pneumatic controllers, integrater timing mechanisms were employed to control the valve openand-close period during the tensecond cycle. This system of lime control solved the problem. The precision is very high. The valve is not subject to abrasion because it is completely open or completely closed. Dirt, chips, or clods in the lime have no effect on the system operation.

Thus, we see that it may be necessary to experiment a considerable amount to find a final control element that will adequately do the job. It would have been easy at any point in this development to have thrown up our hands and said, "The control is no good; let's take it out." The results, however, have been very rewarding and more and more uses are being found for this so-called, "Time Modulated Control of Reagent Feeding." It's a whole new approach, particularly to lime feeding.

It is thus seen that what is needed most of all for the practical application of control engineering techniques is trained control engineers with imagination who are backed up by a progressive and patient management. Plainly, the application of more control in the present day plant is entirely practical.

#### SELECTION OF A-C DISTRIBUTION EQUIPMENT

(Continued from page 76)

for maximum efficiency in moving from one location to another.

#### Modern A-C Section Lay-out

The transformer is installed as close to the working face as possible, and sections of cable are added as the section is advanced. Enoco frequently uses as much as 1500 ft of secondary line and still maintains good face voltage.

The junction box with its quick connectors is readily moved from one location to another. This unit must be kept close to the working face since the length of the trailing cables is invariably governed by permissibility regulations.

#### Power Factor

Use of a-c equipment in the mines does have a definite bearing on the power factor. This however can be overcome with the installation of capacitors.

Prior to the installation of three a-c continuous mining machines, management's experience showed a power factor ranging from 95 to 97 percent over a period of three years. The increased use of a-c equipment reduced this to as low as 87 percent during some periods.

The installation of capacitors resulted in an average power factor of 99.7 with a savings in power cost enough to pay for the entire installation in less than three months.

#### Summary

Experience at other mines can assist management in making some decisions regarding purchase and installation of cables and other equipment; however, each mine is an individual design problem.

Cooperation between management and manufacturer, close study of existing installations, and research can continue to stimulate this advancement in a-c mining.

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# INDUSTRIAL MINERAL RESOURCES

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# THE WESTERN STATES\*

In a decade or less, nearly all of the industrial

minerals will be needed in greater quantities than are available from presently known reserves in the West. It is probable, however, that the resources are available—they need only to be proved and made ready for the consumer. It's

up to the mining industry to help do this job

By RICHARD M. FOOSE

Chairman, Department of Earth Sciences Stanford Research Institute

NDUSTRIAL minerals are big business! Each year since the war their mining, milling, and marketing have increased in volume, tonnage, and value. During 1957, when metal prices sagged and metal mining companies cut back production, most industrial minerals were being produced in larger volume, few suffered price cuts, and some actually had price rises. These are tangible reasons why the mining industry

should be interested in industrial minerals.

Oddly enough, most people do not seem to associate industrial minerals with the mining industry. This is less true now than 10 years ago, but it is a fact that most miners and producers of industrial mineral products have been the "stepchildren" of the mining industry. Perhaps the discovery and development of a metal

mine or the "bringing in" of an oil well is more dramatic than producing materials for cement or inorganic chemicals. But they are not more important to our modern civilization.

## Dollar Value Often Exceeds That of Metals

Since World War II the dollar value of industrial minerals produced





Last year, four of the eleven western states, traditionally thought of as major metal producers, had industrial mineral production and value in excess of the metals (excluding uranium). In two states the value was approximately equal for metals and industrial minerals. Pictured is Permanente Cement Company's 2,500,000-bbl plant at Lucerne Valley in Southern California

in the United States has exceeded that of the metals. Only iron, uranium, and copper are in the first division of dollar value with sand and gravel, cement, crushed stone, clays, fertilize materials, and sulfur. A host of other industrial minerals have rapidly rising use and value curves.

In 1954, for instance, the total value of iron, copper, lead, and zinc production in the United States was almost exactly 1.5 billion dollars. The value of crushed stone and cement produced in the nation that year was nearly 1.4 billion dollars—almost equalling the value of the four leading metals. If sand and gravel and clay were included, the total value of the four industrial mineral products would be almost two billion, or 25 percent more than the four metals.

Even in the western states, traditionally thought of as the major metal producers, similar patterns prevailed. In California, for instance, during 1956 the value of cement and sand and gravel production alone exceeded 215 million dollars while the total value of the 11 leading metals in the state was less than one-fourth of this-approximately 50 million. Since the discovery of gold in California, the total value of gold produced to the end of 1956 was not quite 2.4 billion dollars. This is only 19 years of California cement production at present rates or 24 years for sand and gravel. In fact, during the past year production of metals and mineral fuels both declined in California while industrial minerals increased significantly. Only the price increase for oil and gas kept up the value for mineral fuels.

True, California has never been as important a metal producer as Arizona, Utah, or Montana, for example. However, in recent years each of these states has registered a significant increase in tonnage and value of industrial minerals. In some of the Rocky Mountain states, such as New Mexico and Colorado, the value of industrial mineral production now is roughly equal to that of the metals if we except the value of uranium produced in them. For instance, during 1956 New Mexico produced 72.8 million dollars worth of potassium salts and 63.2 million dollars worth of copper, these two being the state's most valuable commodities except for the fuels. In Colorado during the same year the value of sand and gravel was almost equal to that of zinc at 11 million dollars; the value of lead was 6.2 million, and that of crushed stone 5.2 million.

Of the eleven western states, last year four of them had industrial mineral production and value in excess of the metals (excluding uranium); five states produced more metals of greater value than the nonmetals; in two states the value of production was approximately equal for metals and industrial minerals. The populous west coast states—Washington, Oregon, and California—achieved their major mineral wealth from exploiting industrial minerals, excluding, of course, the mineral fuels. The next most populous states, Colorado and New Mexico, are the two states in which industrial minerals have achieved nearly equal rank with metal production. Except for Wyoming, the other states having smaller populations produce smaller tonnages of industrial minerals.

## Increase Keyed to Population and Industrial Growth

These figures have been cited to provide a factual background for understanding and appreciating the close relationship between industrial minerals, their resources, and the vigorous population and industrial growth of certain regions. This relationship is especially true for the large volume, low cost commodities such as the construction materials: sand and gravel, cement, crushed stone, clay for brick, pipe, and tile, gypsum, and materials for lightweight aggregates such as pumice, slag, cinders, and expanded shale. These materials are fundamental to growing communities and industrial centers-for buildings, roads, runways, dams, and harbors.

Not only is there large demand for construction materials, but also for many other industrial minerals that would receive little attention were it not for rapidly growing population centers in which people's rising standard of living has created new and increased demands. For instance, the tremendous growth of the fertilizer industry has been in response to both the need for increased productivity

from the land and the gradual metamorphism of farming into a major industry. The chemical industry probably provides the most spectacular examples of all. Since 1940 there has been greatly increased production of such raw materials as sulfur, fluorspar, salt, barites, titanium minerals, and borax to name a few, all of them in response to the large needs for inorganic chemicals. Not all of these "needs" are critical but all of them are real. Many of yesterday's luxuries are the so-called necessities of today and it is surprising what a significant effect the changing demands of the people can make upon the requirements for certain material resources. In his Jackling lecture of 1957, J. L. Gillson characterized this trend aptly by pointing out that about 200 million aerosol dispensers-utilizing chlorine and fluorine from industrial mineral resources-would be made during 1957 to meet the demand for ". . . insect sprays, fire extinguishers, air fresheners, and shaving cream. The largest number of all would be used for lacquer hair sprays."

These examples clearly indicate that the key to expanding production and ultimate development of the West's industrial mineral resources is the population growth of the western states and, in turn, the growth of western industry. Between 1939 and 1956, there has been an industrial growth rate of 3.5 percent per year. This growth rate is expected to continue or increase. Demand for industrial minerals of virtually every kind will certainly increase.

Two examples of industrial mineral commodities that have had recent rapid growth are instructive. The potash industry of New Mexico sold nearly two million tons in terms of  $K_20$  equivalent during 1956. This was



Gypsum, with its rapidly increasing demand for the manufacture of wallboard and other products, is one commodity for which presently developed reserves are inadequate. Pictured is a gypsum pit in the western United States



Limestone on the way to a consumer:
Large - volume, low-cost materials such as this must be supplied from relatively nearby sources.
Hence, there is an interlocking relationship between population centers and usable resources

double the amount of 1946, three times that of 1942, and 30 times that of 1930 when Carlsbad production began. Between 1950 and 1956, five companies increased production of potassium salts from about one million to nearly two million tons per year and during the same period of time increased the percent of total U. S. potash production from 84 to 91 percent. In 1957 two new companies entered the potash field in New Mexico with about a 40 million dollar investment to participate in supplying a market for fertilizers and chemicals that has consistently expanded for more than 25 years.

Since the middle '40's western phosphate production has been enjoying a major boom. At that time a new Idaho producer began a vigorous program of exploration, development, and production, at the same time stimulating markets for phosphate. Early activities by this company attracted several chemical companies who constructed plants of their own to produce triple and super-duty phosphate fertilizers, elemental phosphorus, and phosphoric acid. All of the operators have expanded considerably. In 1956 nearly 11/2 million tons of phosphate rock were produced with a value of 6.3 million dollars.

Bentonites in Wyoming and boron minerals in California are examples of many other non-metallics that have been intensively exploited in recent years, particularly by the chemical industry.

## What Is an Industrial Mineral Resource?

The unusually rapid recent development of certain industrial minerals focuses attention on the question: What is an industrial mineral resource?

The question is not simply answered, because mineral occurrences are seldom considered as resources unless there is a demonstrated need for

the commodity. One may speak of the large resources of sand and gravel in the stream valleys of the Sierra foothills in response to knowledge of an existing and rapidly growing need for sand and gravel in California, or one may comment on the large resources of shale from the Keasey formation in Oregon knowing of the recent success in hadeite production near Portland and its widespread use in lightweight aggregates.

However, not many have heard anything about wollastonite resources of the West. The main reason is that this calcium silicate mineral has no ready market. And yet research by the Godfrey Cabot Co., who operate the only mine in the nation at Willsboro, New York, indicates appropriate uses for the material in the ceramic and paper industries where it may one day have an important market. Nor is there general discussion about resources of chlinochlore, diopside, epidote, or enstatite, just to mention a few minerals not now important but which by virtue of their chemical composition might become important materials in the ceramics, refractory, glass, or steel fabricating industries.

Resources are directly related to needs, no matter how the needs are created. Witness the present intense effort to develop new resources of borates in the Southwest in response to the stimulus of need for boron chemicals and solid fuels. With many industrial minerals increased needs have developed so recently that little is known about the sources-and the resources-of these raw materials. This is just another manifestation of the explosive growth in demand for industrial minerals. Now it is important to recognize this demand, just as we have recognized our dependence on certain basic metals for many years, and to plan for tomorrow's use of these new minerals. This also means that a current assessment of industrial mineral resources in the West can be only general and tentative because of the rapid changes and new developments now taking place. Worthless rock today may be tomorrow's prime resource.

The interlocking relationship of population centers to the constructional raw materials cannot be overemphasized. With few exceptions, the need for these large-volume, low-cost materials is met from local or relatively nearby sources. Cement, crushed stone, sand and gravel, lime, and heavy clay products are produced in Washington to meet the needs of Seattle, in Oregon to meet those of Portland and other cities, and in Colorado to meet the needs of Denver. Any assessment of resources of these raw materials must, therefore, be on a local basis rather than for the eleven western states as a region.

The industrial minerals of intermediate volume and dollar valuesuch as potash, phosphate, sulfur, salt, gypsum, fluorspar, asbestos, titanium and boron minerals—have less geographical dependence. In this respect they are more like the metals. Their resources can be assessed for all of the eleven western states as a large region. Of course, this is an oversimplification. For instance, gypsum can be shipped more cheaply from San Marcos Island in the Gulf of California to Washington State than it can be hauled overland from much nearer deposits. With many of these raw materials, particularly the heavy construction materials, the cost of transportation is a dominant factor. A tidewater location for both the raw material and its consumer market can readily determine whether or not the deposit will be exploited.

Many of these same industrial

Many of these same industrial minerals share with low-grade metallic ores the common problems of how to mine them cheaply and efficiently and also how to beneficiate them economically. Both mineral groups deserve much more research attention than they have received.

During the last 15 years there has been some outstanding research in a few special fields, such as clay mineralogy and pegmatite beneficiation. Hopefully, the increasing importance of industrial minerals to an everwidening consumer market plus the need to exploit them efficiently and economically will stimulate research dealing with mining methods, beneficiation, new uses, and marketing. Research in these areas could significantly improve the industrial mineral resource picture for the western states.

## Some Reserves Inadequate for Future Needs

This is not the occasion to assess the resources of each of the many industrial minerals in the western states. However, a general survey of major groups of the industrial minerals may be helpful.

Construction materials comprise the principal group, largest in terms of volume, tonnage, and value produced. These are sand and gravel, crushed stone, cement, lime, clay, gypsum, and recently the materials for lightweight aggregate, like cinders, pumice, slag, perlite, and shale. As a whole, reserves are adequate to large, although not always conveniently placed with respect to centers of population and major construction. A need exists, therefore, to develop additional reserves of some of the construction materials. Gypsum is a good example. In the past couple of years gypsum was produced, mostly in small quantities, in five western states; California, Colorado, Idaho, Montana, Nevada. In addition, large quantities of gypsum were imported from other sources. With the rapidly increasing demand for gypsum in the manufacture of wallboard and other products, this is one commodity for which presently developed reserves are inadequate.

Inorganic chemicals are second in importance only to construction materials. Boron minerals, potash, fluorspar, sulfur, pyrites, phosphate, titanium minerals, lithium, sodium, and other salts are in this category. The rapid growth in production and value of such minerals has been caused by more than just industrial needs; rising living standards is also a factor. The raw materials for inorganic chemicals are higher priced per volume than the construction materials and, therefore, are not tied so closely to smaller regional demands. Transportation costs are less important.

Consider a few examples. The West's major supply of sulfur is from the Gulf Coast or foreign sources. Only in the last ten years have a few of the western states begun to produce sulfur from sour gas, a large untapped resource for many years. Another large, latent source of elemental sulfur is smelter stack gases. Also, tremendous amounts of sulfur are locked up in gypsum and anhydrite.

Titanium minerals are imported from Australia primarily for paints and pigments. Much of the fluorspar to meet western needs comes from non-western sources.

Discovery and development of new sources of sulfur, titanium, and fluorspar, particularly in the coastal states would be significant. In summary, the presently developed western reserves of industrial minerals to support the inorganic chemical industry are generally inadequate, especially when measured against the future.

Fertilizer materials comprise a third group for which existing and developing resources are currently adequate. Potential reserves of phosphate and potash in New Mexico and the northern Rocky Mountain states are able to meet growing demands.

Clays for ceramics, whiteware, refractories, paper filler, and other needs are currently adequate. However, developed reserves of this fourth group of materials are inadequate for continued rapid industrial growth.

Our glass sand resources are not adequate now to support the existing and fast growing glass industry.

There are other somewhat smaller, more specialized groups of industrial minerals, such as mineral fillers, insulator materials, and those that meet the special needs of the steel industry (limestone, fluorspar) or oil industry (bentonite and barite). In these groups western resources are both large and small. For instance, diatomite has been developed extensively in recent years and reserves are large. On the other hand, new large resources of western fluorspar and asbestos are needed.

A summary of the industrial mineral situation can, in somewhat oversimplified and incomplete fashion, be given as follows:

- 1. Reserves believed to be ample for a long time include diatomite perlite, trona (sodium carbonate), and clays for heavy products.
- 2. Reserves of some other minerals are large, but with demands increasing these should be considered adequate only for the next five to ten years. In this group are:

sand and monazite gravel crushed stone tale for specificalcium and cations magnesium (locally) chloride lithium salts cement materials sodium gypsum sulphate phosphate rare earths pumice and potash lime and cinders limestone boron minerals

3. Another group of minerals comprise those whose adequacy for the near future is doubtful:

specialty clays
such as
bentonite,
kaolinite
mica
feldspar
barite
beryl
shale for
hadeite
fluorspar

refractories,
especially
high-alumina clay,
bauxite and
chromite
glass sand
sulfur
magnesite
high calcium
limestone

4. Other minerals in great demand, but of which western supply is deficient, are:

abrasives asbestos zircon

titanium minerals

Admittedly, not all may agree with these listings. However, the following conclusion appears sound, although it may be surprising. With few excep-tions, nearly all of these industrial minerals-from the construction materials to specialty minerals-will be needed in greater supply in the next five or ten years than are readily available from presently known reserves in the West. This statement should in no way be interpreted as saying that resources of these materials are lacking in the western states. It is probable that there are large potential resources of most of these minerals; they need only to be proved!

The significance of the West's rapidly expanding population and industrial development has already been manifested in the unusual stimulation of industrial mineral production. In the future several things are bound to happen: (1) Demand for all industrial minerals will be greatly increased, (2) many presently know occurrences will be developed into proved reserves, (3) and there will be greatly increased research on the problems of exploration, mining, beneficiation, development of new uses, and marketing of these minerals.

Industrial minerals have been a growing giant in our midst. Industry generally appreciates them. It is time the mining industry does so.



"He prospects in regions not even a mule can get to."



### As Viewed by HARRY L. MOFFETT of the American Mining Congress

NOW that the 1958 general elections, except in Alaska, are history, Congressional leaders of both political parties are looking ahead to the convening of the 86th Congress on January 7. The 86th will be the last Congress to serve during President Eisenhower's tenure of office, and may be expected to be somewhat less than fully cooperative in acting on White House legislative proposals.

The U. S. Senate, which has consisted of 96 members since Arizona was admitted to the Union in 1912, will have 98 members when swearingin ceremonies are completed in Janu-The additional two will represent Alaska, which is holding its first general election as the 49th State on November 25. Likewise, membership of the House of Representatives will be boosted by one to 436, as Alaska is entitled to one seat in that body. The increase in the House membership will be only temporary, however, for the total will revert to 435 as the result of the decennial reapportionment of seats to the States following completion of the 1960 census.

The Bituminous Coal Operators Association and the United Mine Workers of America have been holding intermittent conferences on general coal problems, including working conditions, but a BCOA spokesman said that a new wage agreement, while entirely possible in the next few weeks, is not imminent. The approximately 180,000 bituminous miners are working under an agreement signed two years ago which can be terminated only upon 60 days' notice by either party. No termination notice had been served as of late last month, so industry and union negotiators were under no deadline to reach an agreement.

### PRESIDENT SETS LEAD-ZINC OUOTAS

The White House announced late in September that the President had agreed with the Tariff Commission's unanimous finding last April that escape-clause relief is called for in the case of lead and zinc. At the same time the President issued a proclamation limiting imports of metal and

LEAD-ZINC: Import quotas invoked.
OIL IMPORTS: Coal opposes new control program.

BARTER PROGRAM: Temporarily halted.

INTERNATIONAL: Lead-zinc talks set.

IRON ORE: Tariff Commission calls hearing.

COBALT-TUNGSTEN: Import probe begun.

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concentrates by quotas equivalent to 80 percent of average annual commercial imports during the five-year period 1953-1957.

The President's action was simultaneously made known by Secretary of the Interior Fred Seaton at the opening session of the American Mining Congress Convention in San Francisco, where industry spokesmen, after noting that the quota plan was not as broad as the Tariff Commission had recommended, agreed that the plan should be given "a good try."

The new quotas, allocated quarterly among exporting countries, amount to an import limit of 354,720 short tons annually of lead and 520,960 short tons annually of zinc, and in both cases include metal content of ores and concentrates.

The cutback from current import levels, however, will be somewhat greater than 20 percent. On the basis of half-year figures, Bureau of Mines officials estimated that 1958 imports of lead and zinc would have reached 635,645 tons and 712,328 tons respectively if the quotas had not been imposed.

Officials of the Bureau of Customs, which is administering the quota program, announced that domestic importers will be on a first-come, first-served basis until a quarterly quota is

oversubscribed. If the quota is open and applications for entry of lead or zinc would result in oversubscription then entries will be granted on a prorated basis.

The new quota system had hardly gotten under way when the U. S. Customs Court handed down a decision which eventually could have repercussions on the President's action in the lead-zinc escape-clause case. In a case involving duties on imported bicycles, the Court held that (1) the President does not have power to modify—although he may accept or reject—Tariff Commission recommendations in escape-clause cases arising under the Trade Agreements Act, and (2) the Commission and the President must act within the time limits prescribed in that Act.

The Justice Department has announced that it will appeal the decision to the Court of Customs and Patent Appeals.

This case involved a suit brought by bicycle importers after the President, acting under the escape-clause provisions of the Trade Agreements Act, had belatedly proclaimed a lesser increase in duties on imported bicycles than recommended by the Tariff Commission. The Court held that if Congress had intended the President to modify tariffs as he saw fit, "it would have been a simple matter" for Congress to so phrase the Act, and added that "If the President does not accept the findings of the Commission he should reject them." The Court also noted that the elapsed time in this case was nearly 13 months, whereas the law gives the Commission nine months to report to the President, who in turn must act within 60 days.

The President's action in placing quotas on imports of lead and zinc followed a somewhat similar pattern. He allowed more than 60 days to elapse before he acted on the Commission's recommendations and then proclaimed them in greatly modified form. It is generally believed that the final outcome will rest with the Federal Courts.

### COAL INDUSTRY AIRS QUOTA VIEWS

The National Coal Association has termed "inadequate and ineffective" the Government's proposed revision of the voluntary oil import restriction program, under which quotas for the import of crude petroleum will be based on domestic refinery runs.

Tom Pickett, NCA executive vice president, said in a letter to Captain Matthew V. Carson, program administrator, that the coal industry "strongly opposes" the new program because it would not reduce total oil imports nor would it limit shipments of the residual oil which is displacing coal in many Eastern Seaboard markets.

Noting that bituminous coal production for the first nine months of 1958 fell 22 percent below the like 1957 period, Pickett stated that "Neither the proposed regulations nor the general marketing policy of the oil importing companies recognize the general reduction in industrial energy requirements in recent months."

He also pointed out that "the Administration in recent weeks has given its sanction to the use of quotas to meet import problems affecting domestic industry," a policy which the coal industry has advocated for years. The report of the Presidential Advisory Committee on Energy Supplies and Resources Policy in 1955 found that imports in excess of the 1954 relationship of domestic petroleum production to imports would threaten national security, Pickett's letter stated. "This finding is valid and the coal industry urges that it be observed," he added.

Captain Carson is studying the suggestions and recommendations submitted by interested parties on the proposed revision of the oil import control program, following which he will submit his conclusions on a new program to the special Cabinet Committee supervising the program.

### BARTER PROGRAM TEMPORARILY STYMIED

Among the laws enacted by Congress near the end of the last session was one which was designed to step up the bartering of Governmentowned surplus agricultural commodities for minerals and materials of foreign origin. But, because of its phraseology, the new law has had the opposite effect for the time being, with no barter contracts entered into since September 6.

Congress expressed its desire for barter acceleration by directing the Secretary of Agriculture, "whenever he determines that such action is in the best interest of the United States, and to the maximum extent practicable," to barter or exchange surplus agricultural commodities for such strategic or other materials "as the

President may designate." Congress made its intent plain, but temporarily threw a monkey-wrench into the works when it gave the President the job of designating eligible minerals and materials.

The monkey-wrench is the phrase "as the President may designate." Prior to the passage of this new law, the Secretary of Agriculture was empowered to make such designations, although in practice he did not do so without consulting other interested agencies of the Government, including the Office of Defense Mobilization.

Under the new law, the President first must issue an Executive Order, now being drafted, which will name a Government Department or agency to prepare a new list of foreign-source minerals and materials eligible for barter. This agency, probably the Agriculture Department, undoubtedly will be required to confer with other interested Government Departments. including State, Interior, Commerce and the Office of Civil and Defense Mobilization, following which it will prepare and publish the new list. Only then will the barter program be resumed, according to Government spokesmen.

It is generally predicted that lead and zinc will be again included in the more comprehensive barter program expected to ensue.

#### GENEVA LEAD-ZINC TALKS SET

Representatives of the United States and some 30 other lead-zinc producing and consuming countries were scheduled to meet November 6-11 in Geneva, Switzerland, to continue multilateral efforts initiated at London in September to work out a method of stabilizing world markets for these metals.

The meeting was called by the United Nations Interim Coordinating Committee on International Commodity Agreements, which earlier had been informed that the United States favors further exploratory talks although it is not advocating any specific proposal.

Probable outcome of the Geneva meeting was expected to be the establishment of a study group to consider what action the various countries may take to achieve a degree of price stability.

Meanwhile, C. Douglas Dillon, Under Secretary of State for Economic Affairs, in opening a session of the General Agreement on Tariffs and Trade (GATT) last month in Geneva, said the United States prefers the "maintenance of a healthy international economic system" rather "than efforts to regulate production, prices and trade in particular commodities," but is now willing, on a case-by-case basis, to see if some mutually acceptable plan can be worked out.

### COMMISSION PLANS IRON ORE HEARING

The Tariff Commission has announced that it will conduct a public hearing in Washington January 6 in connection with an investigation of the United States iron ore situation ordered last July by the Senate Finace Committee. The hearing is for the purpose of giving interested parties an opportunity to present their views.

The Committee called for a report from the Tariff Commission setting forth a summary of the facts obtained in the investigation, including a description of the domestic industry, domestic production, foreign production, imports and their sources, consumption, channels of distribution, U. S. exports, prices of domestic and imported ores, and United States customs treatment (including trade agreement obligations with respect to such treatment) since 1930.

The investigation is strictly a factfinding undertaking, and the Commission is not required to make any recommendations in its report, which must be in the hands of the Committee not later than March 1, 1959.

#### COBALT, TUNGSTEN IMPORT PROBES BEGUN

The Office of Civil and Defense Mobilization has undertaken investigations to determine whether imports of cobalt and tungsten ore and concentrates are threatening national security. The probes are being conducted in conformance with the national-security provision of the Trade Agreements Extension Act of 1958.

Before its amendment in the 1958 Act, the national-security provision merely provided that the President after investigation could "adjust" imports of any commodity if he found that such imports threaten to impair the national security. The revised section, while continuing the President's broad authority to adjust imports in whatever manner he chooses. requires him, in reaching a decision, to consider "the impact of foreign competition on the economic welfare of individual domestic industries and any substantial unemployment, decrease in revenues of the Government, loss of skills or investment, or other serious effects.'



"It all started when this guy comes in with his super-duper scintillator."



E. P. Humphrey Chairman

WITH American economy rising faster than was believed possible by the most optimistic a few months ago, the coal industry is looking forward to increased demands for our country's prime source of energy. It comes as no surprise, therefore, to learn of the great interest that is being expressed in the planning of the 1959 Coal Show of the American Mining Congress. To be held at Cleveland's Public Auditorium next May 11-14, the Coal Show is attracting world-wide attention.

# The 1959 Coal Show

### All Signs Point to Biggest Convention and **Exposition in History**

Under the chairmanship of E. P. Humphrey, president, Stonega Coke and Coal Co. and Westmoreland Coal Co., the Program Committee for this great industry affair will hold its first meeting shortly to select subjects for discussion at the Convention. Made up of a wide cross-section of the coal industry-including operators from all the major coal fields, representing both deep and strip mines, together with a representative group of mining equipment manufacturers-the committee is responsible for putting together a program that will bring the industry up to date on latest advances in mining and preparation techniques, safety and a wide variety of special industry topics.

In addition to an outstanding pro-

gram, the 1959 meeting will feature the biennial Exposition of mining equipment. It will offer an unparalleled opportunity to inspect and compare the most recent advances in the tools of the industry-from crescent wrenches to hundred-ton capacity trucks and complex continuous mining machines. Equipment manufacturers are leaving no stone unturned to make this the greatest Coal Show ever held and these efforts mean that those who attend will get more out of the meeting than ever before.

It is not too early to make plans to attend. Housing again will be handled by the Cleveland Convention Bureau and reservation forms will be mailed to the industry at an early date.

### — Members of Program Committee -

E. P. HUMPHREY, Stonega Coke & Coal Co. (Chairman) H. BASTIAN, Vascoloy-Ramet Corp.

H. W. BRADBURY, Glen Alden Corp. J. ALLAN BROOKES, Mather Collieries

N. T. CAMICIA, Island Creek Coal Co.

L. C. CAMPBELL, Chairman, Coal Division, A.M.C.

L. H. CHALFANT, Bethlehem Mines Corp.

WM. J. CRAWFORD, Princess Elkhorn Coal Co. J. E. DAVIS, Guyan Eagle Coal Co.

JOHN A. DUNN, Island Creek Coal Co. E. F. ECKHARDT, A.E.P. Service Corp.

P. P. FERRETTI, Pocahontas Fuel Div., Consolidation Coal Co.

K. L. FITTS, Mack Trucks, Inc.

J. ROBERT FLETCHER, J. H. Fletcher & Co.

J. N. GEYER, Imperial Coal Corp. A. G. GOSSARD, Snow Hill Coal Corp.

R. G. GREER, International Harvester Co.

E. T. GREGORY, B. F. Goodrich Co.

STANLEE HAMPTON, Tennessee Consolidated Coal Co. H. JOHN HARPER, Eastern Gas & Fuel Associates

JOSEPH HARRIS, Russell Fork Coal Co., Inc. R. J. HEPBURN, The United Electric Coal Cos.

WM. E. HESS, Vesta-Shannopin Div., Jones & Laughlin Steel Corp. JACK H. HOW, Western Machinery Co.

R. H. HUGHES, Clinchfield Coal Co., Div. of Pittston Co.

JAMES D. IRELAND, Peters Creek Coal Co. R. H. JAMISON, JR., Delmont Fuel Co.

S. B. JOHNSON, JR., The Lorado Coal Mining Co. DON JOHNSTON, Peabody Coal Co.

WILMOT C. JONES, Jeddo-Highland Coal Co. RAY L. KAGA, Bixby-Zimmer Engineering Co. FRED W. KIRBY, National Electric Coil Co. RALPH E. KIRK, Kirk & Cowin, Inc. ROBERT W. LAHR, Enterprise Wheel & Car Corp. HUGH B. LEE, JR., Maumee Collieries Co. R. L. LLEWELLYN, Eastern Gas & Fuel Associates WM. C. McCULLOCH, Roberts & Schaefer Co. J. L. McQUADE, Donegan Coal & Coke Co. G. W. MERRITT, The Nolan Co. L. C. MOSLEY, Marion Power Shovel Co. K. M. PATTERSON, Westinghouse Electric Corp. MOSS PATTERSON, West Kentucky Coal Co. E. R. PHELPS, Pittsburg & Midway Coal Mining Co. E. R. PHILLIPS, Lee-Norse Co. E. P. REED, Tennessee Coal & Iron Div., U. S. Steel Corp.

H. E. JONES, JR., Amherst Coal Co.

WM. H. RITTER, Reitz Coal Co. JOHN L. ROMIG, Atlas Powder Co. WM. E. SCHROEDER, Schroeder Bros., Inc.

F. EARLE SNARR, Freeman Coal Mining Corp. RICHARD T. TODHUNTER, JR., Barnes & Tucker Co.

R. M. von STORCH, Columbia-Geneva Steel Div., U. S. Steel Corp. C. W. WATERMAN, JR., McNally-Pittsburg Manufacturing Co.

W. S. WEBSTER, Walter Bledsoe & Co. T. R. WEICHEL, The Okonite Co.

J. E. M. WILSON, Jeffrey Manufacturing Co. ROLAND WILSON, Bell & Zoller Coal Co. KENNETH YOUNGS, Saxton Coal Co.



The following organizational changes have been announced by the Anaconda Co.





R. B. Caples

W. Wraith, Jr.

Russel B. Caples, vice president in charge of metallurgical operations, will continue as a vice president of the company. In addition to other special assignments, he will coordinate and supervise the integration of all Anaconda's aluminum interests.

William Wraith, Jr. has been advanced to the newly-created position of metallurgical manager and will direct and supervise the metallurgical operations of Anaconda and its subsidiaries.





T. K. Graham

A. C. Bigley

Thomas K. Graham, formerly manager of the Raritan Copper Works of International Smelting & Refining Co., has been named assistant metallurgical manager of Anaconda.

The retirement of Arthur C. Bigley, general manager of western mining operations for Anaconda, has also been announced. Bigley began his career with the company as a miner at the West Greyrock mine in 1913. In 1947 he became general superintendent of mines at Butte and in 1951, manager of mines. In 1952 he was named general manager of western mining operations.

Joseph H. Reitz, district manager of Republic Steel Corporation's northern coal mines has been named manager of safety for the company's coal and ore mines. Joseph N. Hedding, former general superintendent of the northern coal mine district, succeeds Reitz as district manager.

F. O. Davis has been made president of Potash Company of America. Since joining PCA in 1936, Davis had served as comptroller, treasurer and executive vice president. He succeeds Coope who has served PCA as president for the past 21 years.

R. P. Wilson and George Stachura have joined Bell & Zoller Coal Co. as assistants to the vice president in charge of operations.

Wilson formerly was associated with the Freeman Coal Mining Co. and Stachura joined Bell & Zoller from Old Ben Coal Corp.

At the same time it was announced that Eugene T. Moroni has left Bell & Zoller to join the Coal Processing Corp., Norton, W. Va., as superintendent. Formerly chief engineer of Bell & Zoller's Southern Illinois Division, Moroni was general superintendent of the West Kentucky Division for Bell & Zoller prior to his resignation.

John B. Harten was recently appointed assistant superintendent of maintenance-mechanical for the Eastern District, Iron Mining Operations of the Oliver Iron Mining Division of U. S. Steel Corp. on the Mesabi Range. He succeeds Charles A. Lindbergh who has retired.

Thomas W. Mitcham, consulting mining engineer and geologist, has moved his office from Flagstaff to Tucson, Ariz. In addition to conducting his consulting business in Tucson, Dr. Mitchum will give lectures for two graduate courses in geology at the University of Arizona on a parttime basis.

John Stuart Smart, Jr., was recently appointed general sales manager of American Smelting & Refining Co. and Ralph L. Wilcox was named assistant sales manager. Smart, who joined Asarco in 1936 as metallurgist, will be responsible for the administration of the sales department and for the sales of his company's major metal products and the by-products of primary metal smelting and refining.

Island Creek Coal Co. has announced that R. M. Johnson, manager



of the Rockhouse Division, has been named manager of mines and that L. G. Barber has been promoted from assistant division manager to manager of the Rockhouse Division.

R. M. Johnson Johnson joined R. M. Johnson Island Creek in 1947 as a section inspector in the Industrial Engineering Department. As manager of the Rockhouse Division his duties included operational direction of five of Island Creek's mines in West Virginia and Eastern Kentucky.

Barber joined Island Creek in 1932 in the Engineering Department.

Aluminum Company of America has announced the broadening of its mining division with the addition of such activities as exploration for and development of oil and gas, and general geological exploration for minerals, fuels and related functions. The division has been renamed the Raw Materials Division with George W. Streepey being appointed general manager. Streepey had been mining division production manager before the change.

Jack H. McWilliams, geological engineer for Alcoa since 1942, is manager of ore exploration. He succeeds Dr. A. H. Sutton, chief geologist in the mining division since 1953, who will be given special assignments in Alcoa's geological programs.

In early September, D. H. Davis was appointed assistant to D. L. Mc-Elroy, vice president, operations, Con-



solidation Coal Co. Davis had been operating vice president of Mathies Coal Co., a Consolidation subsidiary, for six years and prior to that was division superintendent for Fittsburgh Coal Co., another

D. H. Davis Consol subsidiary. He has been with Consolidation and subsidiary companies since 1933.

At the same time, it was announced that J. S. Whittaker, vice president, operations, of Pittsburgh Coal Co., would assume responsibilities for operations at Harmar Coal Co. and Mathies Coal Co.

Other personnel news was that John L. Rozance was appointed general superintendent of Pittsburgh Coal Co. and the following changes were made at Mathies Coal Co.: Robert D. Lauder was named general superintendent; M. F. Florjancie was appointed superintendent, and William Kebbish was named underground superintendent.

Robert G. Doyle was recently appointed geologist with the Mine Geological Survey. Prior to his appointment, Doyle was for five years associated with the St. Joseph Lead Co. in Southwest Missouri as mine geologist. He



has also been spent several years in Peru as a field geologist.

J. E. Tobey, Jr., was elected secretary and manager of the Mid-West Coal Producers Institute, Inc., in mid-September. A. J. Christensen, former secretary and manager, will continue to serve in a consulting capacity in addition to his duties as secretary of Northern Illinois Coal Trade Association.

Kennecott Copper Corp. has announced that Edwin E. Dowell has been appointed public relations director, Western Mining Divisions, and Maurice C. Stritmatter has been named director of industrial relations for the Utah Copper Division.

Dowell, former field relations director of Reynolds Metals Co., will direct and correlate public relations activities for Kennecott in Utah, Nevada, Arizona and Mexico. work has been handled on a consulting basis for the past eight years.

Stritmatter fills a post which has been vacant for several months. He was formerly director of personnel relations for the Utah Construction Co. at San Francisco and has wide experience in industrial and labor relations.



Shields

Paul L. Shields, a veteran of 34 years in the coal industry, retired in mid-September as president of Spring Canyon Coal Co., Standard Coal Co., Standard Coal Inc., and Royal Coal Co. These com-panies have mines in Carbon County, Utah.

Shields entered the coal industry in 1924 in the sales department of the Sheridan Wyoming Coal Co. and was promoted to general manager in 1934. He joined U. S. Fuel Co. in 1939 as assistant to the general manager and in 1940 became general manager. In 1948 he became president and general manager of Royal and Spring Canyon Coal Companies.

S. K. Droubay, general manager and a member of the board of directors of United Park City Mines Co., has been elected vice president in addition to his other duties.

Henry F. Warden, vice president and head of the old Pocahontas Coal Operators Association, was named president of the new Smokeless Operators Association, a combination of the Pocahontas group and the Winding Gulf Operators Association. With 30 million tons of annual coal production represented, the new group has been called the largest local coal operators association in the country.

Alan R. Fraser, formerly with Armour Research Foundation as supervisor of Extractive Metallurgy Research, and with Chromium Mining & Smelting Corp. as vice president of exothermic alloys-Sales & Services, has joined American Chrome Co., Nye, Mont., as director of metallurgical sales and services.

C. F. Clement, Jr., has been elected president of Rich Hill Coal Mining Corp., Cresson, Pa. He succeeds C. F. Clement, Sr., who retired as president but retains his position as chairman of the board of directors. Ralph E. Moore was elected vice president and general manager.

The election of J. Harvie Wilkinson, Jr., as a director of the Freeport Sulphur Co. has been announced. Wilkinson is president of the State-Planters Bank of Commerce and Trusts, Richmond, Va.

On September 1, J. M. Connor, vice president of Allegheny Pittsburgh Coal Co. and Windsor Power House Coal Co., both subsidiaries of West Penn Power Co., retired after 43 years in the mining industry. J. S. Gelston, mining engineer, succeeded Connor.

The elections of Albert P. Gagnebin as a vice president and Joseph M. Weldon as an assistant vice president of The International Nickel Co., Inc., were announced by Henry S. Wingate, president of the company.



A. P. Gagnebin J. N. Weldon Gagnebin's association with the

company dates from 1930 when he completed work for a mechanical engineering degree at Yale University and undertook graduate studies in metallurgy. In 1955 he was made assistant manager, in 1956 he became

manager of the Nickel Sales Department and in 1957 was elected an assistant vice president.

Weldon, who attended Columbia University, has been associated with the company since 1927 in various positions in sales, executive and other departments. He has been assistant to the vice president of Inco since 1953

O. E. Pothier, director of mine operations, Chemical and Minerals Division of the J. R. Simplot Co., announced the following changes in personnel and operating assignments: Philip T. Peterson, formerly manager of Gay phosphate mine at Fort Hall, Idaho, is now manager of the new Simplot clay mine operations at Boville, Latah County, Idaho. Clouser, formerly mine superintendent, has been advanced to general superintendent at the Gay mine at Fort Hall, Idaho. Dave Aro, formerly resident engineer at the Gay mine, is now Superintendent of the Centennial mine near Monida, Mont. Robert Hill, formerly associated with The Anaconda Co. has been employed as resident engineer, and Norman Lehman, recent graduate of Stanford University has been employed as geologist for the Gay mine.

#### — Obituaries —

Donald H. McGeorge, president and director of Cherry Hill Coal Corp., died September 4 in Cleveland, Ohio, at the age of 51.

Mr. McGeorge was also president of Cherry Hill's subsidiary companies in West Virginia and Maryland. Before he organized the firm in 1954, he was vice president of the Downing Coal Co.

Wells F. Anderson, 56, senior vice president of operations and a director of the National Gypsum Co., died September 21 in Buffalo.

Hugh P. Stith, Sr., 67, a coal mine operator in the Birmingham, Ala., area for more than 40 years died September 30 at Birmingham.

William Cordes Snyder, retired consulting engineer, died September 24 in Greensburg, Pa., at the age of 83. Following service on the Engineering Corps of the Reading Railroad, Mr. Snyder entered the mining industry with the Mining Engineering Department of Fennsylvania Coal & Coke Co. In 1902 he joined Lehigh Coal Co. as general manager of bituminous mines. He established himself as a consulting engineer in 1924, continuing in this field until his retirement in 1948.





#### Quebec Cartier Project Progressing

Two major contracts for the Quebec Cartier Mining Co. iron project in Quebec have been announced. This development is sponsored by U. S. Steel Corp. C. A. Pitts of Canada, Ltd., and Foley Bros. of Canada, Ltd., have been awarded the contract to build the 193-mile railway to the iron deposits at Lac Jeannine. A general construction contract for the 60,000-hp hydro-electric generating plant on the Hart-Juane River was awarded to Foundation Co. of Canada, Ltd.

Other developments included an announcement by U. S. Steel on October 3 that a contract to build office buildings, dormitories, cafeteria, and auxiliary buildings and services at Port Cartier went to Komo Construction, Ltd. Facilities will provide living quarters and office space for the company throughout its construction stage.

The 200-mile access road from Port Cartier to Lac Jeannine, which was constructed by the joint venture of Perini-O'Connell-Quemont, is now completed. A temporary cargo dock for the unloading of construction materials and equipment at Port Cartier also is being constructed by Perini-O'Connell-Quemont and will be completed shortly.

Although the Quebec Cartier project is now definitely started, the company has not yet revealed the target dates for completion of various parts of the project.

#### Report Favors Doorless Coal Mine Ventilating Systems

Coal mine ventilating systems designed to control main air currents without using doors are best from the standpoint of efficiency, safety, and economy, according to a Bureau of Mines report recently released by the Department of the Interior. The report is based on studies of effective coal mine ventilating systems in which overcasts, undercasts, and regulators replace doors. D. S. Kingery and E. J. Harris of Pittsburgh, Pa., both with the Bureau's Mine-Ventila-

tion Section, wrote the illustrated report.

A copy of Information Circular 7853, Coal-Mine Ventilation Without Doors to Control Main Air Currents, can be obtained from the Publications-Distribution Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13. Pa.

#### **New Lead-Zinc Markets Sought**

Nineteen lead and zinc producers of four continents recently announced through their trade associations the appointment of a director to head a cooperative research program aimed at developing new knowledge and creating potential new uses for the two metals.

Named to head the program was Dr. Schrade F. Radtke, heretofore director of the metallurgical research laboratories of Reynolds Metals Co. at Richmond, Va. He will develop plans governing the research projects under the direction of the industry development committees of the American Zinc Institute and the Lead Industries Association, and will recommend the degree of emphasis to be placed on fundamental and applied research

Simon D. Strauss, vice president of American Smelting and Refining Co. and chairman of the joint program's executive committee, said that no limit had been set by the sponsoring producers on expenditures for research. Funds would be provided for any project receiving approval of the respective committees, and financial support would come from assessments on the total lead-zinc metal production of the nineteen supporting producers. Companies, research agencies and universities will be engaged in the world-wide effort.

Producers include leaders in the lead and zinc industries of Australia, Canada, Great Britain, Mexico and South America as well as of the United States.

The joint undertaking reflects an increasingly aggressive attitude on the part of both lead and zinc industries in their search for broader markets, according to Strauss.

#### Aluminum Trucks Hold 60 Tons of Coal

Six aluminum coal haulers, capable of holding nearly 60 tons of coal, were recently delivered to Aluminum Company of America. The bottom-dump haulers will be leased from Alcoa by Squaw Creek Coal Co. to move coal 2½ miles from strip mines to a tipple near Boonville, Ind. From here, the processed coal will be moved by rail to Alcoa's nearby Warwick, Ind., power plant. When the mine goes into operation, this plant will (Continued on next page)

Julian D. Conover (left) executive vice president of American Mining Congress, looks on as H. B. McCoy (center), administrator of Business & Defense Services Administration, congratulates Harold A. Montag, director of commercial research for Joy Mfg. Co., after he was sworn in as advisor for Mining Machinery in the Agricultural, Construction, and Mining Equipment Division of Montag, who has been with Joy for 12 years, served with the old War Production Board in World War II and then was director of the Mining Machinery Division of National Production Authority, which was set up in the Korean conflict.

#### Industrialist Named Division Aide in BDSA



(Continued from previous page)
power an aluminum smelter, now
under construction.

Built by General American Transportation Co., the trailers measure 37 ft long, 11 ft wide and 9 ft deep. A 335-hp engine, in a heavy duty tractor, supplies power for each trailer. The tractor drive tires and trailer tires measure five ft in diameter and contain 28 plies.

#### Central West Acquires Pocahontas Mine

Central West Coal Co. has announced the acquisition of a new mine at James, W. Va., and the appointment of Central West as exclusive agent for the output of the Pine mines of Pine Township Coal Co., Inc., Heilwood, Pa.

The newly acquired mine, the only one operating in the No. 2 Pocahontas Seam, will be under the management of the Central Pocahontas Mining Corp., a newly created subsidiary of Central West. Currently it has an output of 1000 tpd, but production is to be stepped up to 3000 tpd by the first of the year.

With its mines now in full production, Pine Township is producing at a 3000 tpd rate. This property has reserves of 35,000,000 tons of Moshannon seam coal, backed up by an undeveloped reserve of 50,000,000 tons of Lower Kittaning seam coal.

#### Award Given to Outstanding Industrialist

George H. Deike, chairman of the board, Mine Safety Appliances Co., has been selected as western Pennsylvania's outstanding industrialist for the year 1958, by the Western Pennsylvania Chapter of the Society of Industrial Realtors. The award is given to an industrialist who, in the opinion of an impartial and distinguished Board of Awards, has made a most significant contribution to the industrial development of western Pennsylvania in the public interests.

President of MSA until 1953, when he became chairman of the board, Deike is active in the daily operations of the company and its many subsidiaries. In addition to these, he serves as chairman of the board of Catalyst Research Corp. of Baltimore, president and director of Pennsylvania Research Corp., director of Grant Building, Inc., director of Potter Bank and Trust Co., and trustee of Dollar Savings Bank.

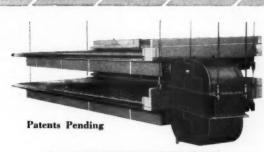
#### Correction

In the article, "Fine Coal Preparation and Closed Circuit Operation," by M. C. Chang, appearing in the September issue of Mining Congress Journal, an error was made on page 56. In the sentence, "The presence of the plus 65 mesh, however, was undesirable since . . .", the plus 65 mesh should have been plus 32 mesh.

#### A.I.Ch.E. Symposium on Pollution Control by In-Plant Measures

The annual meeting of A.I.Ch.E. will be held in Cincinnati, Ohio, December 7-10, with a Symposium on Pollution Control by In-Plant Measures scheduled to be held on the last day. C. Fred Gurnham, head, Department of Chemical Engineering, Michigan State University, will be chairman of the symposium. Speakers will include T. F. Barnhart, Senior Process

Engineer, Blaw-Knox Co., who will talk on "Waste Reduction by Material Salvage in the Metallurgical Industries." Another paper to be given, "Good Housekeeping for the Reduction of Metal-Finishing Wastes," will be coauthored by C. A. Walker, professor, and J. A. Tallmadge, assistant professor, Department of Chemical Engineering, Yale University.



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Not only that, but the two identical decks operating in floating suspension greatly reduce impact to the building structure, permitting lighter, less expensive steel construction. With all of these advantages, the high efficiency of the famous DIAGONAL-DECK® table is positively maintained. One integrated head motion operates both decks simultaneously. Special models available for high refuse feeds. For full information, send for Bulletin 77.

For Single Deck Installations, Use the Super-Duty® No. 7 Table



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#### Freight Charges on Coal Reduced

The Interstate Commerce Commission has given final approval to reduced freight rates on bituminous fine coal shipped from mines in Alabama, Kentucky, Tennessee and Virginia to Tampa and Sutton, Fla. The rates, proposed by major southern railroads, were made effective last December to meet the competition of coal and fuel oil moving by barge to Tampa and Sutton, where the Tampa Electric Co. maintains three steam electric powergenerating stations. The ICC now has found the lower rates to be reasonable and discontinued its investigation of them. This means, in effect, final approval of the special rates.

#### **Anaconda Announces New Subsidiary**

Clyde E. Weed, chairman of the board of The Anaconda Co., has announced the formation of a new Anaconda subsidiary, Anaconda-Jurden Associates, Inc. The new organization, formerly the extensive engineering department of the parent company, offers a complete service in the planning, designing, engineering, and construction of industrial plants of major size. Wilbur Jurden of New York has been named president and chief engineer of the new concern,

and Herman H. Boschen of Dobbs Ferry, N. Y., has been designated vice president and assistant to the chief engineer. The subsidiary's headquarters are located at 26 Broadway, New York.

The former Anaconda engineering department is a completely integrated unit which, since World War II, has



Clyde E. Weed, chairman of The Anaconda Co., right, is shown together with William Jurden (left), who recently was named president of Anaconda-Jurden Associates, Inc., a new wholly-owned subsidiary named in Jurden's honor

designed and constructed more than a billion dollars of metallurgical and industrial plants in the western hemisphere. These facilities include not only plants erected for Anaconda and its subsidiaries, but also a commercial taconite plant for Erie Mining Co. in Minnesota and numerous key installations for Phelps Dodge Corp. in both Arizona and California.

Presently under the new subsidiary's supervision for design and construction are the \$110,000,000 El Salvador sulphide copper plant project of Andes Copper Mining Co. in northern Chile, Anaconda's \$40,000,000 integrated aluminum fabricating plant in Terre Haute, Ind., Chile Exploration Company's 50,000-kw high pressure power plant at Tocopilla, and others.

#### **Expanded Coal Use in South**

Middle South Utilities, Inc., which serves markets in Arkansas, Louisiana, and Mississippi, is planning its steam generating facilities with the realization that "we are approaching the time when coal will be used," President Edgar H. Dixon told the Washington Society of Investment Analysts on September 17. Middle South's annual report for 1957 states: "The system now uses natural gas as its principal fuel, with oil as a standby fuel. However the economics in the use of natural gas and its availa-

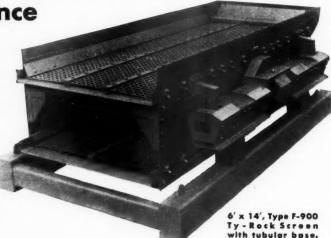
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The Ty-Rock wastes no power in useless, harmful racking of buildings or supporting members. It delivers all of the intense power to the job of stratifying and separating the sizes.



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Ty-Rock and Ty-Rocket Screens, Tyler Standard Screen Scale Sieves, Ro-Top and Ty-Lab Sieve Shakers.

(Continued from previous page)

bility have been changing over the past several years. As a result, the system is now looking toward coal-fired generating units, where appropriate, as a means of continuing economical operation."

#### ALSO . . .

Island Creek Coal Co. has taken an option on a tract of land near Clarington, Ohio, for a new coal mine and river loading facility. The company's option was revealed during a U. S. Engineers' hearing on sites for a proposed dam in the Clarington area. The property is owned by the Pennsylvania Railroad through a subsidiary, the Manor Realty Co. Final negotiations for the land will depend on the Governmet's decision as to the location of the dam.

Congress has appropriated \$1,719,-000 for a new Bureau of Mines' laboratory at Fort Snelling, Minn. The laboratory will expand the Bureau's mining and metallurgical studies on manganese, iron, nickel-copper-cobalt ores and many other resources of the north central states. Among these studies are the search for a process to permit economic use of large reserves of low-grade manganese material found in the Cuyuna Range of central Minnesota, and studies of the problem of producing a useable product from the vast non-magnetic taconites of the Lake Superior region.

Headquarters of the High Volatile Coal Export Assn., Inc., has been transferred from New York to Cincinnati, Ohio. The transfer was voted by directors and was expected to improve efficiency of the association.

Olin Mathieson Chemical Corp. has joined with French, British and Swiss interests in a \$135,000,000 project to develop bauxite deposits in French Guinea, part of French West Africa, and to produce alumina. Known as FRIA Compagnie Internationale pour la Production de l'Alumine, the new corporation will construct and operate one of the world's largest plants for the reduction of bauxite into alumina. The facility will have an initial capacity of 480,000 tons of alumina a year, but is designed for possible expansion to 1,200,000 tons a year. The FRIA plant will be connected with the seaboard by a 96-mile railroad.

United State Steel's Robena Mine Team No. 2 has won first place in the mine rescue contest sponsored in August by the Southwestern Pennsylvania Safety Association. Other winners were Montour No. 4 of Consolidation Coal Co., second, and Robena Mine No. 1, third.

Over-all injury experience at crushed-stone operations participating in the National Crushed Stone Association Safety Competition of 1957 was one of the best in the 32-year history of the contest, according to the U. S. Bureau of Mines. Injury records have improved over the

competing years, and in 1957 both the severity and frequency of injuries were lower than in the preceding year. The injury-severity rate of 1097.040 days lost per million manhours worked in 1957 is the second lowest in 32 years of competition. These improvements indicate the usefulness of safety competitions and furnish an incentive to participate in accident-prevention programs.

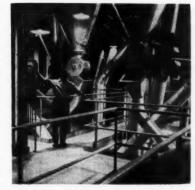
Plans for the consolidation of the Pocahontas Operators Assn. and the Winding Gulf Operators Assn. have been announced. The new organiza-tion will have 26 members and be called the Smokeless Operators Assn. Together, the members accounted for over half of the 51,000,000 tons of coal produced last year in District VII which embraces four producing areas in southern West Virginia and southwest Virginia. The new organization was formed to handle the common problems of the smokeless coal producers in the area, and will deal principally with labor relations, production problems, public relations and legislation. The main office of the association will be in Bluefield, but another office will be maintained in Beckley, W. Va.

Andes Copper Mining Co., a subsidiary of The Anaconda Co., has announced plans to invest an additional \$25,000,000 in its El Salvador copper mine. The amount will raise the company's total investment in the mine to \$103,000,000.

#### Black Lake Exemplifies U. S.-Canadian Cooperation

Cooperation was the keynote at the dedication October 16 of ASARCO's Lake Asbestos of Quebec, Ltd., at Black Lake, Quebec. The Honorable Maurice L. Duplessis, Prime Minister of the Province of Quebec, said, "There are some that say American and foreign capital should not be allowed to enter the Province. Don't pay much attention to them. American capital is welcome in the Province of Quebec, and will always be treated fairly and generously by the Provincial government." The Prime Minister lauded the initiative which has developed a heretofore unavailable natural resource into its full potential and told his audience, "This project could not have been completed without American capital."

Robert D. Bradford, president of Lake Asbestos and vice president and director of ASARCO, continued to stress cooperation by saying, "We are proud that Black Lake is considered an outstanding example of international cooperation. It demonstrates what can be accomplished by pooling Canada's natural resources with the resources of American business, and as an unusual engineering achieve-



ment, it shows clearly the advantages of combining the engineering skills of both nations. It is also gratifying to us to contribute to Canada's growth and prosperity."

Mining operations at the site are expected to yield 100,000 tons of asbestos a year for at least 20 years from open-pit mining. After that underground mining will probably be necessary. The unusual features of development of the property centered about the extensive hydraulic plan

necessary to drain the lake which overlaid the ore body, and the removal of over 27 million cu yd of mud and silt from the lake bottom. These operations were described in detail in the October issue of Mining Congress Journal.

The Black Lake installation features a new 5000-tpd mill which cost more than \$9,000,000. It is 14 stories high, and houses three miles of conveyors, five miles of aspiration lines and chutes, and 630 electric motors. The predominant process in the mill is air separation of the fiber; over 980,000 cfm of air is required for operation. Dry crushed ore is fed to heavy shaking screens equipped with powerful air suction hoods. The shaking action screens out sand, and as the ore moves along, the fiber rises through the rock fragments and is removed by suction as it passes under the hood. The asbestos is cleaned and graded by feeding the fibers to cyclone collectors. The heavier fractions, comprising rock particles and unopened fibers, fall vertically; air suction draws the lighter asbestos fibers off sideways to be graded according to length by passing through flat or rotary screens,

The electric utility and coal industries have joined forces to finance a major research program to seek new ways to reduce sulphur dioxide and other contaminants in flue gas as produced and eliminate sulphur in steam coals prior to burning. Present methods are economically unattractive, according to Bituminous Coal Research, Inc., which is sponsoring the project with the Association of Edison Illuminating Companies and Edison Electric Institute.

A new, continuous process to produce zinc as a thin foil has been developed by American Smelting and Refining Co. at its central research laboratory, South Plainfield, N. J. A pilot plant unit is now turning out developmental quantities of the foil in sheets ranging from 0.005 to 0.001 in. in thickness, and 26 in. in width. Asarco expects that the foil will find a market in certain electrical applications, and is now contemplating the installation of a larger scale pilot unit at its Corpus Christi, Texas, plant.

The Philo plant of Ohio Edison Co. at Philo, Ohio, has in service an electric generator that uses only 0.65 lb of coal to produce a kilowatt hour of electricity. The first plant built by Thomas A. Edison about 80 years ago used ten lb of coal to do the same job.

International Minerals and Chemical Corp. formally opened its \$5,000,-000 administrative and research center in Skokie, Ill., recently with a series of open houses for a total of more than 3000 guests from the Chicago area. There are 600 employes at the new headquarters center of International, which is a leader in the mining, refining, and processing of non-metallic ores and chemical derivatives, with 68 mines and plants and a product list that totals 60 items. Facilities comprise five buildings just completed and a research center built on a 21-acre site in 1951.

Peabody Coal Co. has started operations at a new mine two miles north of Calhoun, Mo. The mine will have a rated capacity of 500,000 tons a year.

Jones & Laughlin Steel Corp. plans to spend \$35,000,000 on improvements at its Pittsburgh and Aliquippa Works. A company spokesman said \$20,000,-000 will be spent on a program for beneficiating iron ore, The other \$15,000,000 will be spent for 59 new by-product coke ovens at the Pittsburgh Works, a new iron ore sintering plant at Aliquippa, ore screening facilities at Aliquippa and a continuous annealing line for tin plate at Aliquippa. It is hoped that all the projects will be completed in 1959, with work beginning late this year.

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#### Chino to Get New Skip Haulage System

A skip haulage system which will cost more than \$2,000,000 will be installed at the open pit copper mine of Kennecott Copper Corporation's Chino Mines Division in Santa Rita, N. M. The new installation, which is relatively new in open pit copper mining, will be completed sometime next year.

When constructed, the system will include two 40-ton skips or ore buckets which will be pulled by cables up an incline track from the bottom to the top of the pit. The skips would have a hoisting capacity of around 18,000 tons per day, assuming the material is hoisted the full length of the track.

Plans call for the skip to be installed in the southwestern portion of the pit where the vertical distance from the top to the bottom is approximately 600 ft. The ore buckets will be loaded by trucks at a station near the bottom of the mine. At one station, the skips will discharge waste. Ore will be deposited at another station. This material, in turn, will be moved either to the dumps or the reduction plant by train.

Officials said the new installation will enable the mine to haul more efficiently from the lower areas—which is becoming more expensive as the pit grows deeper. At the present time, trains are used to haul the ore and waste from the lower benches and this involves an increasing number of switchbacks as well as increased haulage distance.

Plans for a similar method of open pit haulage were recently announced by Kennecott's Nevada Mines Division. Although standard practice in some underground mining, skip haulage is relatively new to open pit copper mining which depends largely on trains and trucks for moving ore and waste.

The \$2,000,000-plus investment in the skip haulage system brings to approximately \$3,000,000 the amount Kennecott has earmarked for Chino this year. In addition, the division now is enlarging its power plant at Hurley in a project which is expected to cost around \$3,250,000 before work is completed next spring. A total of nearly \$2,750,000 more was appropriated last year for additional locomotives, waste cars, and milling equipment, bringing to more than \$9,000,000 the amount Kennecott has set aside for Chino during the past two years.

#### Affiliates to Merge

A plan to merge the uranium affiliates of Atlas Corp. to form a publicly owned company in which Atlas will be the largest stockholder has been approved by directors of the concerns involved.

The Atlas uranium subsidiaries to be merged are The Hidden Splendor Mining Co., 100 percent owned by Atlas; Lisbon Uranium Corp., about 76 percent owned; Rio de Oro Uranium Mines, Inc., about 61 percent owned; and Radium King Mines, Inc., about 30 percent owned. Also included in the merger is Mountain Mesa Uranium Corp. The surviving corporation will be The Hidden Splendor Mining Co.

The merged company will have gross assets of more than \$50,000,000 and will produce about one-half milion tons of ore per year. Floyd B. Odlum, president of Atlas Corp., will be chairman and chief executive of the new company, and A. P. Kibbe will be president. Kibbe is now president of Hidden Splendor.

Combined production of the merging companies in the first six months of 1958 was more than one-quarter million tons of ore averaging approximately 0.36 percent in grade. The companies being merged have five operating mines: Hidden Splendor's Almar mine; Lisbon's Ike and Columbia mines; Rio de Oro's Dysart mine and Radium King's Red Canyon mine. A sixth mine, in the Gas Hills area of Wyoming, is planned to go into production early in 1959.

The merged company will also have interests in two uranium mills, the Uranium Reduction Co. mill at Moab, Utah, and the Homestake-New Mexico Partners mill near Grants, N. M. Uranium Reduction's mill, which processes the ores from Hidden Splendor

and Lisbon mines in Utah, has just negotiated an extension of its contract with the Atomic Energy Commission from 1962 through 1966.

The merger is subject to Securities and Exchange Commission requirements and approval of the stockholders of the companies involved. It is expected that stockholder approvals will be obtained and the merger consummated before the end of the year.

#### New Ore Cars Haul 100 Tons Each

Six hundred of the most modern ore cars in the country—each capable of carrying nearly 100 tons—are being placed in service carrying iron ore from Kaiser Steel's Eagle Mountain, Calif., mine to its steel mill at Fontana, a 164 mile haul. The 100-ton loads are believed to be the heaviest ever carried on individual rail cars in the West. Conventional cars heretofore used in handling the ore could only load approximately 65 tons.

A run of 100 of the new cars, which were built by the Southern Pacific Railroad, has just been completed from the mine to the mill, hauling nearly 10,000 tons of ore. Railroad officials called the cargo the heaviest load ever pulled over Beaumont Pass in Southern California. The pass is located on the road's main line between Los Angeles and the East.

This 100-car run required five diesel locomotives to control the weight down long grades during the initial stage of the haul on Kaiser Steel's own railroad from the mine to the Southern Pacific's main line at Ferrum. Fourteen S. P. diesel units with a total of 23,500 hp were needed from Ferrum on because of the Beaumont Pass grade and the necessity of moving faster over Southern Pacific's main track.

Built specifically for hauling iron ore, the cars were designed with a shortened wheel base to facilitate loading and dumping and make them easier to handle on grades and curves. The new cars, equipped with higher, tapered sides, are only 31 ft long, yet of such heavy construction that their capacity has been increased 50 percent over the former ore cars.

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#### **Gold Petition Circulated**

The Northwestern Mining Council, headquartered at Medford, Oreg., is circulating a petition throughout the mining industry, to chambers of commerce and civic organizations calling upon Congress to restore to U. S. citizens the right to freely buy, sell and possess gold.

Thad W. Hatten, secretary of the Northwestern Mining Council, reports that more than 130,000 signatures have been affixed to the petition and that strong commendations for the Council's efforts have been received from members of Congress interested in the gold problem. Several thousand petitions were distributed by Hatten at the recent Mining Show of the American Mining Congress.

Hatten has stated that the Council has as its goal a million signers by early next year. He expects that the petition will be presented to Congress at the

next session.

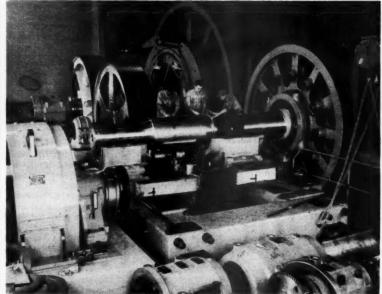
#### Kennecott Benefits from University Research

About five years ago, Kennecott Copper Corp. undertook a unique project. It established a multi-million dollar center on the campus of the University of Utah. The objectives in mind were to: (1) develop better ways to extract metals from ores; (2) recover metals and industrial minerals not then recoverable on an economic basis; (3) work as a support group in evaluation of ores found by exploration or developed in new and existing properties, and (4) carry forward basic studies in the fields of pyrometallurgy, hydro - metallurgy chemistry.

Kennecott's Research Center is unique because no other integrated mining company has a program of such continuing research, on a company-wide basis, dealing with primary problems in process metallurgy—mineral dressing, smelting and refining.

Extensive research efforts, of course, are not unusual to the separate field of physical metallurgy; that is, the development of new alloys, new forms of metals fabrication, etc. Charles R. Cox, when he became president of Kennecott, however, decided to extend research to the basic productive levels of the company. To date the 60-man staff at the Center have completed projects which have really paid off for Kennecott. Some of the results are: (1) a system of leach, precipitation and flotation of copper oxide ores at the Ray, Ariz., Division which has substantially increased recovery of copper; (2) reduction of metallurgical difficulties by improvement of the water used in milling by the Utah Copper Division; (3) development of economic recovery of rhenium; (4) organization of rapid, accurate "instru-ment analysis" which permits the corporation to solve problems heretofore unapproachable by conventional methods; (5) development of new reagents used in selective flotation, and many other worthwhile achievements. One

#### Shaft Replacement Big Undertaking



During a routine reflectoscope inspection of the shaft on the Yates cage-hoist drum at the Homestake Mining Co. in Lead, S. Dak, a flaw or irregularity was discovered at a point about nine ft from the end of the shaft. (A reflectoscope is an electronic instrument that detects flaws within solid materials by the use of sounds that are beyond the hearing range of the human

After this discovery, the hoist was shut down, the clutch removed, and a visual inspection of the shaft was made. A crack was then found which could be seen by the naked eye.

In order to be able to use the hoist as a single drum unit, it was first necessary

to free the damaged shaft from the integral gearing. To do this, the large conical hoist drum had to be first cribbed with timbers. The drum shaft was then burned off, and the hoist made to operate as a single drum hoist.

The new shaft, shown in the picture, cost approximately \$40,000 (not counting installation charges). It is a beefed-up version of the original 42-ft, 30-in, diam shaft. Four and one-half months were required to forge and machine the shaft and it took approximately 10 days, with men working two 12-hr shifts each day, to install it.

The Yates cage hoist is operated by two 1250-hp, d-c electric motors, and has a maximum hoisting depth of 5237 ft.

important subsidiary development the Center has created is greater interest on the part of students in engineering departments at the University of Utah and elsewhere in metallurgical research.

C. D. Michaelson, general manager of western mining operations, pointed out that while outside research organizations may readily and even inexpensively solve a specific problem, the purchaser of such service does not gain the basic knowledge which can be learned from solving that problem. "Such knowledge is valuable. It can be used to solve other problems, too, that might arise in the future," Michaelson said.

#### Bypasses Driven to Control Fire at Kaiser's Koehler Mine

During the last week in September, workmen began building bypass tunnels around the fire area to reach the haulageways to the two main coal production areas at Kaiser Steel Corporation's Koehler mine near Raton, N. M. As previously reported, seals are presently in place in the main passageway leading in from the mine entrance and from two side entrances. After the bypasses are driven around the fire area to the haulageways, men will be able to work back toward the fire area and seal it off from its last two openings.

The mine manager related that 1000 tons of dry ice has been used in combating the fire to date, and for some time there has been no active burning. However, the fire area is still quite warm and there may be some smoldering under caves in the area.

Once the area is boxed in from all directions, any remaining burning or smoldering spots can be attacked in a number of ways at the company's convenience. Workmen can employ additional dry ice; they can resume the chemical foam method which carries water into the burning area; water may be used, or a mud process employed.

The manager could not predict with any accuracy when the bypass tunnels will be completed, or when normal mining operations resume. At the present time, coal customers are being served from stockpiles and from coal obtained from the bypass operations.

#### Interior Department Establishes Office of Minerals Exploration

The Office of Minerals Exploration has been established to carry out the provisions of Public Law 701 (85th Congress) for Federal assistance in financing exploration for new or additional mineral reserves. The authorizing legislation had been submitted to the Congress as a part of the Administration's minerals program.

Proposed regulations governing the granting of Federal assistance will be published in the Federal Register. A 30-day period for comments, suggestions, or objections is provided.

The OME succeeds the Defense Minerals Exploration Administration. The exploration assistance program authorized by the new law is a continuation of the DMEA-type program which started in 1951 under the Defense Production Act of 1950. The DMEA program expired on June 30. The OME will also assume responsibility for the DMEA contracts still in force and for each project certified by the DMEA as a discovery or development. The Congress, in the 1959 Supplemental Appropriation Bill, ap-

(Continued on next page)

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(Continued from page 103) proved funds in an amount of \$4,000,-000 for OME operations.

As a result of congressional action on the enabling legislation, the OME program will differ from the previous DMEA program in three important respects: (1) Applicants must provide evidence that funds cannot be obtained from commercial sources on reasonable terms; (2) interest will be charged from the dates Federal funds are disbursed to operators; and (3) Government participation in any one contract may not exceed \$250,000.

#### ALSO . . .

A new report on the peat resources of Washington State has been released by the State Division of Mines and Geology. It includes an index map showing the location of peat areas, together with maps, profiles and graphic logs of most of the 350 areas described. Chemical analyses of many samples taken from deposits in 14 counties are also listed and discussed. The report was prepared by Dr. George B. Rigg, a recognized authority on peat. The report can be obtained from the Department of Conservation at Olympia for \$4.00.

Lead-zinc research by the Bureau of Mines during the 1959 fiscal year will emphasize metallurgical studies aimed at developing improved methods of processing lowgrade ores now considered sub-marginal. The program will also include studies of mining and milling operations to improve efficiency and increase ore extraction and mill recoveries.

Two new uses for lead and zinc point to the fact that there are many possible new applications of these two metals. For example, lead is a vital component of a new material that is expected to revolutionize the recordplaying industry, and have significant new applications in the electronics and transducer fields. The new material, known to the trade as "PZT", is used for the two small elements that comprise the heart of a new ceramic stereophonic record-playing cartridge.

Asarco has announced the development of a new, continuous process for producing zinc as a thin foil. The company expects that the foil will find a market in certain electrical applications, and as a moisture barrier in insulating compositions. Unlike some other metallic foils, zinc foil can be easily soldered and printed on.

Custom milling of about 1000 tons of manganese ores per day from the Socorro, New Mex., area will result from the purchase of the Anderson Bros. manganese mill by Western Aniline & Chemical Corp. of Tucson. Organized and privately financed as a closed corporation about a year ago, Western Aniline officials said the company has exercised an option to acquire a \$4,500,000 manganese mill at Henderson, Nev.

Officials stated that they believe the Socorro mill will have an assured source of ore for a custom milling operation, and also will provide an alternate source of concentrates for the Nevada operation, which will get its ore principally from mines near Torreon, Mex. The Nevada mill, which is an electric furnace operation, will process about 100 tons of ferromanganese a day. It was acquired in a lease-purchase agreement from Titanium Metals Corp. of America and the National Lead Co.

Howe Sound has acquired Austenal Corp. in a multimillion dollar deal. Austenal, with 2200 employees produced precision castings and was one of the nation's largest cobalt consumers. Howe Sound operates a cobalt mine at Cobalt, Idaho, and refinery at Garfield, Utah. At present, this cobalt cannot economically compete with cheaply produced foreign metal, and sales are wholly to the federal government stockpile.

Silver is the key material in the reactor used for removing radioactive iodine from waste gases liberated at the Hanford, Wash., atomic plant. The silver reactor consists of a small vertical tank packed loosely with small curved pieces of a special ceramic coated with silver nitrate. When waste gases are passed through it, the iodine reacts chemically with the silver. A new reactor catches as much as 99 percent of the iodine in the waste gas. When the efficiency begins

to fall, the reactor can be regenerated by spraying in new silver nitrate and baking it in place. Up to ten regenerations are possible.

A multi-million dollar expansion program is being carried out by Basic Inc. The company, which recently raised a new \$3,325,000 from sale of preferred type stock and mortgage notes, will use the bulk of these funds in payment for new ore dressing and dust collecting facilities at its Gabbs, Nev., magnesite facility. The new plant will extend reserves, and enable the company to manufacture magnesia products from natural ores which will be fully competitive with the refractories made from chemical processes that have come into recent prominence. The Nevada works will be further enlarged to expand the production of caustic calcined magnesite to meet the increasing demand from building material manufacturers, processors of uranium ore and other divisions of the chemical industry.

Development work on Federal Uranium Corp.'s Conjecture silver mine, 66 miles northeast of Spokane, is progressing rapidly. The deep development program will take about a year to complete and will bring Federal's investment in the property to approximately \$1,000,000. Federal became interested in the property when ex-ploration work, started in 1951, showed the Conjecture vein improving in size and values with depth. Supplies are on hand to permit all-winter operations at the camp five miles up Gold Creek from Lakeview, Idaho, on the shore of Pend Oreille Lake.

The combination of uranium interests by Vitro Minerals Corp. of Salt Lake City and Susquehanna Corp. of Chicago, has been called off.

A world record mining depth of 11,000 ft has been reached by the East Rand Proprietary Gold mine at Doksburg, near Johannesburg, South Africa. Refrigeration is being used to cool the mine, which at this depth has a temperature of 123°F. The world's second deepest man-made excavation is the shaft of the Kolar Goldfield in India-10,500 ft deep.

A device using the principle of radar to locate uranium was described to the Atoms-for-Peace Conference which was held in Geneva recently. Three Japanese professors urged geologists to use a "sure and speedy" U-scope device which they said "will surely bring about great progress in the technique of radioactive survey in the future." The U-shaped device employs a scanner and cathode ray tube for the automatic detection of radio-active sources in fields and mines, explained the professors.

STATEMENT, REQUIRED BY THE ACT OF AUGUST 24, 1912, as amended by the acts of March 3, 1933 and July 2, 1946 (Title 39, United States Code, Section 233) showing the Ownership, management and circulation of MINING CONGRESS JOURNAL, published monthly at Washington, D. C., for October 1, 1958.

1. The names and addresses of the publisher, editor and business manager are:

Publisher, The American Mining Congress, Washington, D. C.

Editor, Robert W. Van Evera, Washington, D. C.

Managing Editor, George W. Sall, Washing-

Business Manager, P. D. McMurrer, Washington, D. C.

2. The owner is: The American Mining Congress—a corporation, not for profit, Washington, D.C. No stockholders. President, Howard I. Young, St. Louis, Mo.: Executive Vice-President, Julian D. Conover, Washington, D. C.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. ROBERT W. VAN EVERA,

Editor. Sworn to and subscribed before me this 1st

day of October, 1958. KATHRYN A. HATHAWAY, Notary Public.

(My commission expires July 31, 1962.)

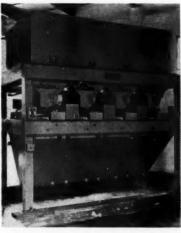
# manufacturers

# forum

# **Expansion Into Mineral Dressing Field Announced**

COMPLETION OF A WORKING AGREEMENT with Carpco Research & Engineering, Inc., Jacksonville, Fla., to manufacture and sell its High Tension Separator to the iron ore industry has been announced by Joy Mfg. Co. This step takes Joy for the first time into producing machinery to beneficiate material used by the iron and steel industry.

A Carpco pilot plant is being furnished by Joy to Jones & Laughlin Steel Corp. for use in Jones & Laughlin's ore research laboratory at Negaunee, Mich. Jones & Laughlin is conducting continuing tests to determine the application of this Carpco separator to its ore bodies in the United States and Canada.



To handle the manufacture and sale of this new equipment, Joy has organized the Minerals Dressing Department in the Mining & Construction Division, and has appointed M. Bruce Mairs as product manager.

Mairs pointed out that because the High Tension Separator is a dry process, the Carpco process will be highly advantageous in beneficiating iron ore material in Canada and other northern areas. Climate problems—especially winter freezing—curtail wet process operation in these areas.

The separation process involves passing the minerals through a very high voltage corona discharge and over fast turning rolls connected to ground. Quartz, the most abundant mineral in most iron ore deposits, is a poor conductor of electricity. It stays pinned to the rolls, while the iron will pass the electrical charge

through to ground and be thrown off and separated from the quartz and other materials.

#### **Rotary-Screw Air Compressors**

FULL PRODUCTION OF POSI-TIVE-DISPLACEMENT rotary-screw air compressors delivering up to 19,250 cfm has been announced by Atlas Copco. The twin-rotor twostage compressors develop four complete compression cycles per revolu-tion, operate at speeds of 3600 rpm, and will be made available to U. S. industry in 6700, 10,000 and 19,250 cfm models. In operation, the compressor draws air into the front end of its twin-screw assembly. As the large threads or lobes of the parallelmounted screws rotate into each other's grooves at high speed, air is spiraled ahead into increasingly small interlobe volumes until it is forced through the discharge port at pressures ranging up to 120 psi. For additional information write Atlas Copco Eastern, 610 Industrial Ave., Paramus, N. J., or Atlas Copco Pacific, 930 Brittan Ave., San Carlos, Calif.

Inquiries about new equipment appearing in Manufacturers Forum are welcomed.

For additional information on any piece of equipment in this section write directly to the manufacturer, or to Mining Congress Journal with name of item and date of issue in which it appeared.

#### Drill

A DIAMOND CORE AND BLAST-HOLE DRILL, the Joy 25 reportedly is designed to operate at full motor power over a wide range of relatively low bit rpm for extremely high torque. The drill has a 14 hp rotary (non-vane) air motor, depth ratings up to 500 ft of AX or 625 ft of EX hole. The machine's feed screw accommodates up to AWX size core bar-rels or AW drill rods. Selection of bit speeds and feed rates from a wide range of gearing ratios fit any formation, according to Joy. Optional equipment includes a choice of single or double column, swivel bracket mountings; and a new pneumatic rod puller designed especially for the 25 drill. For complete details write to Joy Mfg. Co., Oliver Building, Pitts-burgh 22, Pa.

#### Classifier

A CENTRIFUGAL classifier system has been announced which reportedly separates dry fines from coarse materials at efficiencies hitherto unattainable in commercial practice. The classifier has no moving parts and is said to utilize 0.04 to 0.5 hp per ton per hour. According to the manufacturer, the classifier attains its high operating efficiencies by utilizing a combination of aerodynamic forces in obtaining separation of fines from larger material. The classifier is obtainable in sizes to handle from 100 lb to 100 tons of feed material per hour and is particularly recommended for classification applications in the 400-200 mesh range. Additional information may be obtained from the Buell Engineering Co., Inc., 123 William St., New York, N. Y.

#### **Machine Loads Blast Holes**

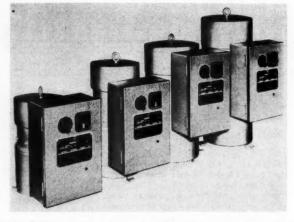
A BLOW LOADING MACHINE which uses compressed air to blow the blasting agent, and also sand stemming, into blast holes has been developed by Atlas Powder Co., Wilmington 99, Del., to mechanize the loading of fertilizer grade ammonium nitrate. Working tests reportedly have demonstrated that the Jetloder, as now developed, can blow 2½ lb per second of ammonium nitrate and diesel oil mixture into a 50 to 60-ft horizontal blast hole. The only basic



equipment requirement for use with the Jetloder includes a compressor to provide air at 45 psi; a truck or other device to move the compressor, blow loading machine and supplies, and a sufficient amount of 1½-in. (ID) plastic pipe to reach from the machine to the back of the blast holes.

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horizontal models, or which can
be off-floor mount-



ed to all-but-eliminate floor space requirements—have been introduced by Exide Industrial Division of The Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa. The EP chargers come in four different physical sizes, and provide a choice of 25 different ratings—ranging from 0 to 800 ampere-hours. They have two, three, and 7½ hp ratings and are designed for two- or three-phase 60-cycle operations at 220, 440 or 550 volts.

#### **Tractor Shovel**

WITH SIX INTERCHANGEABLE BUCKETS that give the Model T-18 Trojan tractor shovel a carrying capacity range of from 14 to 29 cu ft, the multi-purpose machine is said to be especially suited to meet the requirements of the producers and users of bulk materials. This newest addition to the Trojan line has an operating capacity of 2500 lb, a four-ft wheel base and an over-all length of 117 in. The T-18 is powered by a Model 30 Chrysler engine developing 72 hp at 2000 rpm, and is equipped with a Yale torque transmission. Full information may be obtained from The Yale & Towne Mfg. Co., Contractors Machinery Division, at Batavia, N. Y., or San Leandro, Calif.

#### A-C Motor

A WEATHERPROOF a-c motor for use in "outdoor" type applications where the motor is subjected to moisture or the elements is available in all standard speeds in sizes from 1 through 250 hp. An open motor that reportedly exceeds NEMA splashproof requirements, all of its external parts are of corrosion-proof cast iron. Shaft openings are sealed by a shaft cap and slinger. The insulation system is said to be completely nonhygroscopic, and the rotor O.D. and stator I.D. are coated with a rust inhibitor. A non-washing grease is used in the "Metermatic" bearings, which meter in grease from the reservoirs as needed. The watertight conduit box is cast iron with a gasketed cover and threaded outlet. Engineering specifications and prices may be obtained by writing Reliance Electric and Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

#### Jaw Crusher

AN OVERHEAD ECCENTRIC TYPE jaw crusher has been placed on the market by Pioneer Engineering Division of Poor & Co., Inc., 3200 Como Ave., S. E., Minneapolis 14, Minn. Termed "2036," the crusher has a longer jaw than former models for improved angle of nip to reduce "belching." It is hydraulically adjusted for setting to produce materials down to 2½ or 3 in. minus and has a rated capacity under average crushing of 190 to 200 tph of six in. minus product. Rated capacity is 95 to 100 tph of three in, minus product under similar crushing conditions. The base is all welded steel doublewall construction, on which the bearings are saddle mounted to prevent weave and wobble. Bearings are selfaligning spherical roller type.

#### **Transfer Pump**

A BATTERY-OPERATED transfer pump has been announced by Transfer Pump Co., Osburn, Idaho. The device reportedly pumps all petroleum products, syrups, fresh or salt water and any other liquids that are non-corrosive to bronze valves or butyl-lined hose. The pump is operated by a car battery drawing 100 to 110 amps, and can be obtained for either 6 or 12-volt batteries. It is self-priming and is push-button controlled from the nozzle outlet. With a ¾-in. discharge hose and a 1-in. suction line, the device reportedly will pump in excess of 15 gpm.

#### Sand Classification Tanks

HYDRAULICALLY-CONTROLLED sand classification tanks of single, double or triple flume design has been introduced by McLanahan and Stone Corp., Hollidaysburg, Pa. Using a classification method based on the different settling rates of various grain sizes, the tanks are recommended by the manufacturer where large quantities of water must be handled in raw feed from pumps or dredges. The units also are for use where various grades of sand or limestone are required from one feed, and where there are excessive amounts of various grain sizes.

#### **Generator Set**

A PORTABLE generator set developing 35 kw has been announced by the Engine-Material Handling Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis. The W-226 Generator Set is complete as a package, with all controls and accessories needed for immediate use, and can be used either outdoors or indoors. The unit has an over-all length of 68 in. is 26-in. wide and 37-in. high. It can be operated either by gas or gasoline.

#### **High Explosives**

NEW BRAND NAMES for a number of similar grades and types of high explosives have been assigned by the explosives and mining chemicals department of American Cyanamid Co., 30 Rockefeller Plaza, New

York 20, N. Y., to facilitate easy identification of Cyanamid explosives by dynamite users. The new Cyanamid explosives brand names and the former American and Illinois Powder names replaced are as follows:

BRAND NAMES	FORMER ILLINOIS BRAND NAMES	BRAND NAMES
Straight Gelatin	N.G. Gelatin	Straight Gelatin
Powertol	Powertol	Amex
Ajax	Ajax	Semi Gelatin
Cyamite	Gomex	Cyamite
Cya-Gel-Pak	Pliogel	Cya-Gel-Pak
CX Dynamites	G.L. Dynamites	CX Dynamites

#### **Earth Moving Scraper**



ONE OF THE LARGEST and most powerful earth moving scrapers ever marketed anywhere in the world was recently unveiled. The earth mover is labeled with a 70-ton work capacity, roughly equivalent to 50 to 60 cu yd. Vice President R. L. LeTourneau revealed that his firm is planning even larger earth movers within the near future.

Making the new line of self-propelled scrapers possible is an "electric wheel" system, which includes a d-c electric motor geared directly to the inner-rim of every wheel. A-C motors are spotted at other strategic points where power is needed, such as for steering. Electricity for all this is generated by a 600-hp Cummins diesel, coupled to LeTourneau-built a-c and d-c generators under the hood.

According to the manufacturer, there are no wearing parts in the brake system, and "power proportioning" shifts available horsepower away from any wheel which might begin to slip. The machine is about 62 ft long and 14 ft wide, and has an empty weight of 130,000 lb.

Additional information on the company's new earth moving developments may be obtained by writing to R. G. LeTourneau, Inc., 2399 South MacArthur, Longview, Texas.

#### Helicopter Electromagnetic Surveying System

EXCLUSIVE LICENSING for the use of the American Metal Climax, Inc., helicopter electromagnetic surveying system has been announced by Fairchild Aerial Surveys, Inc., a wholly-owned subsidiary of Fairchild Camera & Instrument Corp. Through the helicopter EM unit, known as HEM, Fairchild now offers a new aerial geophysical service with direct application to mineral exploration. HEM is used to locate, from the air, zones of good electric conductivity at or near the earth's surface. Minerals such as sulfides of copper and lead, which are good conductors, reportedly can be directly located by the HEM. Further information can be obtained by contacting Fairchild Aerial Surveys, Inc., 224 East 11th St., Los Angeles 15, Calif.

#### Truck

NO TURN HAULING is possible with the Model 100 Dumptor, according to Koehring Division, 3026 West Concordia Ave., Milwaukee 16, Wis. A 10-yd or a 30,000-lb payload can be handled, and speeds up to 20 mph in either direction are possible because of a constant mesh transmission and torque converter drive. Both an instantaneous gravity and a controlled dump are possible with the Model 100, and a pivoting seat, dual steering wheels and other controls allows the operator to face in either direction.

M. Bruce Mairs has been appointed product manager of the newly cre-



Branch of Joy Mfg. Co. (Canada) Ltd. M. Bruce Mairs He has also served as branch manager of Vancouver branch, and as salesman in various Canadian territories.

Mine and Smelter Supply Co., Denver, has joined forces with its subsidiary company, Colorado Iron Works. and all products of both companies will be manufactured by the parent company.

Donald J. Drinkwater, formerly assistant manager of the company's Marcy Mill Division, is manager of the new Manufacturing Division of the Mine and Smelter Supply Co.

#### – Announcements —

Ernest C. Arbuckle, Dean of the Stanford University Graduate School of Business, has been elected a director of the Western Machinery Co., San Francisco.



L. C. Black chines and blast hole drills.

ploration drilling.

Lewis C. Black has been appointed manager of domestic sales by Bucyrus-Erie Co. He had been manager of sales for large excavators since January, 1958, and had previously served as assistant general sales manager of large ma-

W. A. Davidson has been appointed assistant sales manager at Herb J. Hawthorne, Inc., Houston, Texas, one of the world's leading manufacturers of rotary drill bits for minerals ex-

Edwin H. Johnson, manager of the Mining Tool Division, Kennametal,



E. H. Johnson

Inc., has been named consultant in the development and marketing of new company products in the mineral industries field.

Johnson joined Kennametal in 1947 as sales manager of the Mining Tool Di-

E. H. Johnson vision. Before that he was chief engineer of mines for Republic Steel Corp. and served in engineering and sales capacities with several manufacturers of mechanized mining equipment.

Johnson has taken part in the activities of the American Mining Congress and other technical groups for many years. He authored the book, "Mechanization of Coal Mines."

Edgar W. Engle, recently named manager of mineral industry products for Kennametal, Inc., will be responsible for the Mining Tool Division at Bedford, Pa., and for developing wider markets for hard carbide products in the mining and associated industries. (Catalogs and Bulletins on next page)

#### CATALOGS & BULLETINS

MAGNETIC EQUIPMENT. Stearns Magnetic Products, 635 South 22th St. Milwaukee 46, Wis. Products described include equipment for protection against tramp iron such as magnetic pulleys; suspended magnets; drum, plate, grate and spout magnets, and the electronic metal detector; materials handling equipment like lifting, holding and roadsweeping magnets; parts separators, hand magnets; portable drill stand magnets and grinder holding magnets. The booklet also details information on Stearns equipment for purification and concentration of magnetically responsive materials.

PROCESS EQUIPMENT. Hardinge Co., Inc., York, Pa. Hardinge's complete line of process equipment for mining, chemical, stone, ceramics, water, sewage and industrial waste applications is covered in Bulletin No. 100-B. Equipment for the following process operations are included: agitating and mixing, balling or pelletizing, clarifying, wet and dry classifying, cooling, drying, filtering, feeding, flocculating, grinding or pulverizing, lime treating, sampling, ore scrubbing, heavy-media separating and thickening.

DUST COLLECTOR. Joy Mfg. Co., Oliver Building, Pittsburgh 22, Pa. Bulletin J-616 describes the Joy Microdyne dust collector, a wet inertial type dust collector installed as part of the duct. The 12-page bulletin contains performance curves, complete specifications, accompanying cutaway drawings of the inner construction, as well as a description of a related filter for reclamation or removal of the collected slurry.

CYCLONE APEX CONTROLS. Equipment Engineers Inc., 41 Sutter St., San Francisco 4, Calif. Apex designs and controls for Krebs Cyclones are featured in Bulletin No. 1400. Proper apex discharges relating to classification efficiency of a cyclone in both open and closed circuit applications, cutaway drawings and apex capacity chart for present cyclone users and others with classification problems are covered.

JAW CRUSHER. Rogers Iron Works Co., Joplin, Mo. Bulletin 58-2 describes 13 crusher sizes in the Rogers Heavy Duty line and seven sizes in the Rogers Roadbuilder series. Dimensional drawings and capacity tables are supplied as well as a product chart of size percentages.

CHEMISTRY OF CYANIDATION. Explosives & Mining Chemicals Department, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. Dealing with the chemistry of complex gold and precious metal ores, the publication provides an analysis of the problems inherent in cyanidation of such ores containing coper, zinc, nickel, arsenic and antimony, carbonaceous materials, sulfide minerals and reagents used for the flotation process.

FLEXIBLE PIPE JOINTS. La Favorite Rubber Mfg. Co., 275 Wagaraw Rd., Hawthorne, N. J. A series of four free data sheets containing specifications, prices and installation instructions for its flexible, vibration-absorbing wire-reinforced neoprene pipe joints are being offered by La Favorite Rubber Mfg. Co. The literature covers the company's line of standard and reducer joints in both threaded and flanged types.

CONVEYOR BELT. Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. Bulletin M302 covers the Ray-Man Conveyor Belt. Drawings are used in describing the compensation and other features of this belt, and pages are arranged to represent an actual cross-section of the belt.

### Index to Advertisers

ACF Industries Inc., 28

Acme Machinery Co., 10

Allis-Chalmers Mfg. Co., 25 Engine Material Handling Div.

American Brake Shoe Co., 77 American Manganese Steel Div.

American Cyanamid Co., 36
Explosives and Mining Chemicals Dept.

Atlas Copco, 35

Bethlehem Steel Co., 45

Bucyrus-Erie Co., 20

Caterpillar Tractor Co., Inside Back Cover

Centrifugal & Mechanical Industries, Inc., 100

Colorado Fuel & Iron Corp., 15

Curtiss-Wright Corp., 29 Utica Division

Deister Concentrator Co., The, 97

Denver Equipment Co., Inside Front Cover

Euclid Division, 17 General Motors Corp.

Flexible Steel Lacing Co., 27

Gerow, Theron G., 100

Hendrix Mfg. Co., 7

Hercules Powder Co., 26

Hewitt-Robins, 103

Heyl & Patterson, Inc., 4

Ingersoll-Rand Co., 16

Irwin-Sensenich Corp., 32 (Formerly Irwin Foundry & Mine Car Co.)

Jeffrey Mfg. Co., 5

Joy Mfg. Co., 2, 31

Lee-Norse Co., 12-13

LeTourneau-Westinghouse Co., 3

Longyear Co., E. J., 100

Marion Power Shovel Co., 11

Michigan Chemical Corp., 102

Mine Safety Appliances Co., Back Cover

Moore Company, The, 44

Myers-Whaley Co., 23

National Malleable and Steel Castings Co., 8

National Mine Service Co., 34

Ohio Brass Co., 21

Pattin Mfg. Co., 33

Raybestos-Manhattan, Inc., 18-19 Manhattan Rubber Division

Read, Davis, 100

Roebling's Sons Corp., John A., 9

Timken Roller Bearing Company, 6

Tyler Co., W. S., 98

U. S. Rubber Co., 14

U. S. Steel Corp., 22

American Steel & Wire Div.

Columbia-Geneva Steel Div.

Tennessee Coal & Iron Div.

United States Steel Export Div.

Victaulic Company of America, 27

Western Insulated Wire Co., 24

Western Machinery Co., 30

Woomer, J. W., & Associates, 100

# HURRY-UP HAULER!



LOAD FAST! PR21 offers a big target. Short non-stop turns of DW21-PR21 unit speed spotting under shovel and work in narrow cuts. PR21's special steel withstands impact, abrasion and corrosion—has the stamina to keep production up.



ROLL FAST! DW21 Super-Turbo Engine develops 28% torque rise and 320 HP (maximum output); tractor has top speed of 27.9 MPH. The PR21 has 22.5 cu. yd. heaped and 62,000 lb. capacity. All add up to fast cycles, top production.



DUMP FAST! PR21 has hydraulic hoists for quick and complete 60° dumping of any material. DW21's hydraulic steering facilitates maneuvering. Wide-section, tubeless tires provide maximum flotation and sure-footed traction.

# CAT DW21-PR21 UNITS AVERAGE 5 TRIPS AN HOUR ON 1-MILE ROUND-TRIP HAULS

This is one of the DW21 (Series C) Tractors with Athey PR21 Rear Dump Wagons used by the Yahola Sand & Gravel Co., Fort Gibson, Oklahoma. The units haul gravel from the Grand River to the plant. Each handles an average load of 22 cu. yd. and makes the 1-mile round trip in 12 minutes cycle time. With short turning radius, high cruising speed and fast dumping action, they keep production on schedule day after day during a 6-day week.

Now a new DW21 (Series D) is matched to the 22.5-cu.-yd. PR21 for fast, heavy-duty work. The new DW21 features the Caterpillar Super-Turbo Engine that delivers 320 HP (maximum output) . . . and a 28% torque rise—twice as much as ever before, to handle the roughest terrain.

The Super-Turbo incorporates an important advance in tractor diesel engine turbocharging—a new air induction system. This system allows use of more of the Turbocharger's potential than was possible before. Results: a big torque rise, higher horse-power, better acceleration and gradeability. But more important, faster cycles, greater production and more profit—for you.

Let your Caterpillar Dealer show you how the new DW21-PR21 can step up production and lower costs. He has facts to prove it's a good investment—an investment that he backs with round-the-clock service. Ask him to demonstrate on your job. Just say when and where—he'll be there!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

# CATERPILLAR Caterpillar and Cat ore Registered Trademarks of Caterpillar Tractor Co.



A variety of expert skills are tapped to equip MSA instruments with the precision and sensitivity so essential to protecting miners' lives underground.

### Built-in quality here \_\_\_

increases
safety and dependability
here

Miner squeezes hand-bulb, draws in air sample, and amount of methane registers in seconds on easy-to-read dial of M-S-A Methane Detector Type W-8.

#### M-S-A<sup>®</sup> Methane instruments provide working crews with a wide range of safety checks

M-S-A METHANE DETECTOR TYPE W-8 shown above, gives instant, accurate reading of methane. It's light and portable. Has two scale readings for greater accuracy—0 to 2% and 0 to 5%.

M-S-A METHANE TESTER TYPE M-6 is also available. This pocket sized unit indicates methane as low as .2%. It's new, small, streamlined. Edison Electric Cap Lamp battery provides dependable power. Connects and disconnects easily with battery.

M-S-A WOLF JUNIOR FLAME SAFETY LAMP is made

of lightweight aluminum. Always a dependable steady flame, guarded by improved ventilation. Easy to read, standard size graduated chimney.

M-S-A METHANE RECORDER continuously charts methane concentrations in return air. Accurate safe check against unusual gas conditions. Serves as guide for regulating volume of air to maintain proper economical ventilation standards.

An M-S-A representative will be pleased to discuss the safety aspects of these instruments in relation to your operation. Get in touch with him soon or write us for detailed bulletins.

#### MINE SAFETY APPLIANCES COMPANY

201 North Braddock Avenue, Pittsburgh 8, Pennsylvania

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.

Toronto, Calgary, Edmonton, Montreal, Sydney, Vancouver, Winnipeg

SAFETY EQUIPMENT HEADQUARTERS

